



FRIDAY, APRIL 21, 1893.

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## Contributions.

## Nemesis in the Patent Office Library.

WASHINGTON, April 18, 1893.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

There is one department of the General Government which may be said to suffer persecution at the hands of legislators. In my early inexperience here it puzzled me much why an institution of such pre-eminent usefulness as the Patent Office should be so treated by Congress. I had been accustomed to regard the inventor as one of the most useful of men, and was much surprised when a large body of my countrymen were pointed out as his bitter enemies. Investigations outside of the Patent Office discovered, no enmity to the institution among Congressmen, and yet its warmest friends assured me that nothing but opposition could be expected for measures looking to its improvement. The "farmer vote," "the agricultural interest" must be conciliated, and was strongly and stubbornly prejudiced against the institution, because of a popular and widespread opinion, that it kept up the pieces of agricultural implements. The enmity was unreasonable—but the enemies numerous and all voters.

It must be understood, therefore, that the cutting down of an appropriation for the Patent Office Library from \$5,000 (the yearly allotment from 1879 to 1885) to practically \$1,500 for the coming year has no partisan significance. It is no doubt "economy" with a vengeance, but the fall has been a gradual one through action of successive Congresses. The amounts since 1885 have been \$3,000, \$2,500, and the latest appropriation is, gross, \$2,000. But during these periods an item not previously falling upon the appropriation has each year reduced it by \$500. The net amount of the appropriation that can be allotted this year for new books for the Scientific Library will only be \$700.

But does the Patent Office need books? I asked myself this question, and determining to satisfy my curiosity, have devoted part of this afternoon to conversation with some of the examiners, specially in rooms of the institution where railroad appliances were examined. The stock of new books upon the railroad is so small that the office could be tested here as regards the practical value of the library, and any danger arising from unwise economy be definitely discovered by test cases.

Evidence of the latter point must, of course, arise by inference, from demonstration of the value of a particular book in a special case, and this was at once discovered to me by experience with recent applications. A new railroad book, whose existence had been revealed by a special case, had proved of value to every examiner in this particular room. Had it not been in the library the interests affected directly or indirectly by the claims passed upon by these examiners would have suffered. In fact, the farmers' enmity to the office is working against his interests, even as he regards them. I discovered the claim of a patent for an agricultural implement which had been refused because of an illustrated description found in a book in the library, probably purchased when the appropriation was greater than at present. There is a set of volumes, published one hundred and fifty years ago in Leipsic, the *Theatrum Machinarum*, which has destroyed the claims of many so-called inventions. It may be stated as a fact that so long as the law requires that the claimed invention must not have been described in any printed publication, a niggardly economy in appropriations for the Scientific Library will not only work injustice to the people at large, but will tend not to accomplish what the farmer

in his enmity to the institution wishes to bring about—reduction in the number of patents.

For want of an appropriation the Patent Office has not in its library even a usable series of the patents of two such great empires as Austria and Italy. It requires a duplicate set of patents of any country—one for binding, the other for classification, and, aside from other facilities that cannot be so definitely stated, this important department of the government lacks even the patents of a large portion of Europe.

The individual Congressman has no enmity to the Patent Office as such. His vote against its appropriation is given to please his constituents. Why, then, should not the friends of the Office show their hands, and convince him that the institution has friends? Why should not the farmer be enlightened, since it should be so easy to convince him by a statement of simple facts that his enmity is misdirected? X. Y. Z.

## Coupler Tests.

Brown's M. C. B. Emergency Link  
Car Coupler Company.  
CHICAGO, April 14, 1893.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

I desire to express my appreciation of your article on car coupler tests in your issue of Friday, April 7. It covers all of the questions and valuable points to be considered in tests of M. C. B. couplers; and it seems to me to be thoroughly exhaustive.

We have had practical experience lately in testing our bar, which to our mind convinces us that the tests in both drop and pulling are unnecessarily severe. In the pulling test on our bar we found we were unable to fasten the bar sufficiently to pull it to an extent that would damage it in any way. It was fastened by the over-strap attachment, and at a pull of 130,000 pounds the bolts running through the bar and through the over-strap were sheared off as clean as though cut with a knife. It seems to us that such an experience could not possibly occur in actual service. In the drop test the only damage we were able to inflict was in the bending of the shaft of the bar; and in this also we have serious doubt whether the bar would receive such an injury in service.

We shall be surprised if in the coming tests here in Chicago, and also at Altoona and at the Watertown Arsenal, Boston, the malleable iron bars stand as well as those made of steel, especially if the bars are taken out of stock, and not made especially for the tests.

COURTLANDT BABCOCK, Secretary.

CLEVELAND, O., April 14, 1893.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of April 7 you did me the honor to re-print considerable portions of an article from my pen recently published in the *Railway Age*. You have also made extensive comments in connection with the article and have drawn some conclusions and made some statements with which I do not agree. Perhaps the subject will still bear further agitation and a little additional argument.

I was glad to note that the four conclusions or "useful lessons" drawn by the *Gazette* were exactly what I had intended to convey. You say:

The useful lessons to be drawn from Mr. Waitt's observations are, on the whole, about as follows:

(a) Tests of couplers, both for material, design and workmanship, are necessary.

(b) The guard arm is the weakest part of the vertical plane coupler as now generally made.

(c) There is too much variation in the strength of the designs *per se* of couplers, as now constructed; the one main defect being in the knuckle tongues and pin holes.

(d) Increased strength at the joining of the coupler shank and coupler head is very desirable and may be had without interfering with repairs and interchangeability.

Did you ever stop to think that points "b" and "c" would never have been discovered up to the present time if dependence had been put upon data developed from the shop tests, which were brought out in such prominence in the preceding argument? Fortunately, practical experience with the couplers on the cars in actual service has developed these vital points of weakness, and the remedy is being applied by the leading coupler manufacturers.

I would not for a moment disparage shop tests by railroad companies, and neither would I for a moment consider them as complete or as reliable as the results of actual experience.

The shop tests as recommended last year will undoubtedly show the comparative strength and quality of the metal used in the construction of the couplers, but they will show little or nothing as to the comparative strength of the knuckle lugs to resist abuse with the link and pin. They will also show little or nothing as to the comparative strength of guard arms, the most important of all points in the couplers as at present constructed.

It will be interesting, perhaps, to call attention to a practical result of shop tests. It is a curious fact that three prominent roads, which more than any others in the country spend much money in maintaining physical laboratories and test departments, with all the opportunities they have for tests, are to-day using principally the style of coupler which, from the records in the two statements given in my paper, show the largest percentage of breakage of guard arms and knuckles broken in pinholes, of all the more prominent couplers recorded. The shop tests in those cases, if we judge the result by

the action taken, did not prevent these roads from using a weak coupler. Theory is good, and I would not for a moment speak against it, but a little theory backed by considerable good practice is, in my opinion, the best basis to build on, for permanence and security.

In your editorial you object to my remarks favoring, as one essential point in selecting a good coupler, "The style of coupler where greatest care is used in testing and inspection of material prior to shipment."

My paper was written with the idea of giving some practical suggestions to railroad companies, which could safely be used to assist them in the coupler question at the present time, and under the conditions on which most railroad mechanical departments are run at the present time. The railroad companies representing the largest total of mileage in this country are not equipped with test departments, and they are not subjecting "axles, wheels, boiler material, oils and all other important purchases to standard tests." If this was done, it would undoubtedly be productive of excellent results in the way of economy and improvement of the grade of material, but most roads are getting such results from actual service tests. Service tests are more reliable than shop tests. Nothing can better show this than the greatly varying results between shop and service tests in the field of air brakes during the past twelve months. It took the results of actual service to show some points of vital weakness, while severe rack tests had developed nothing of the kind.

Knowing such facts as the above mentioned, and also knowing that the M. C. B. test for couplers proposed last year could not possibly develop either of the vital weaknesses of the M. C. B. couplers, I would hardly care to risk my reputation by recommending accepting as the best coupler the one showing best results under the M. C. B. tests; and especially when I know of two makes of couplers which have shown a splendid record under both pulling and drop tests, which, in service, have shown serious defects and weakness which would go a long way toward condemning them in the eyes of a practical man.

I could name companies to-day who are furnishing railroads with important supplies who have earned deservedly a reputation for subjecting all their goods to thorough inspection and test. I venture to say that probably no railroad in the country thinks of subjecting these companies' goods to inspection and tests before accepting, for all are satisfied that the manufacturers have a thoroughly established system in this matter and are more careful and thorough in testing than any railroad would think of being. As one of the above companies I would name the Westinghouse Air Brake Co.

You further say: "Mr. Waitt does not do justice to the proposed Master Car Builders' tests when he concludes that such tests of vertical plane couplers do not show the character of material or the endurance of a coupler." I fail to find that I made such a statement as the above. For I do believe that the tests show the character of material and also the amount of hammering on the face of knuckle that a coupler will stand. My criticism of the proposed tests was that they did not show the strength or endurance of the couplers to resist strains in service that cause—

1. Guard arms to break.
2. Shanks to break back of heads.
3. Knuckles to break through pinholes.

Or, in other words, as the above three sources of breakage are the principal causes of replacement as shown by the statements made from results of actual service, "it is a singular fact that not one of the tests so far given in detail by the committee shows whether a coupler or knuckle is deficient in strength in the most vital parts."

Your editorial acknowledges that the testing of the guard arm is only incidental. I think no sane man would arrange to test the comparative strength of guard arms by seeing how many blows it would take on the knuckle to bend it, so that the weight would glance off on to the guard arm, thereby allowing the knuckle to absorb an indefinite part of the blow and the guard arm receive the very uncertain amount of force still unexpended. The way to test a guard arm is to test it with a fair straight blow, with neither knuckle nor anything else to interfere.

I notice also that you acknowledge, after all your arguments in favor of the supremacy of the shop test, that shop tests do not show, and probably cannot show, the comparative weakness of knuckles through pinholes, for you say: "It is not clear how a drop-pulling test will show anything more about the pin-hole breakage than is evident when one knows the kind of the material and the thickness of the knuckle in front of the pin hole." I fully agree with this, but would suggest that a service test will show considerably more about the comparative results as to pin-hole breakage. If pin-hole breakage were caused by the use of a straight stiff pin, used in the proper manner, a shop test might develop needed information, but as it comes most frequently from a crooked pin reaching only through one lug and just catching in the other, it makes the service test the only one which can truly show what coupler will stand the most abuse in service.

I said in my paper that the proposed tests do not in any way test the strength of the shanks. The principal cause of breakage of shanks is from the lip on the head



coming in violent contact with dead wood or end sill, producing a severe leverage which breaks the shanks just back of the head.

The drop test as now arranged only shows the general resistance of the shank to crushing or bending; it does not show the comparative resistance to breaking off from the above-mentioned most prevalent cause of such breakage. To properly test this, it should be arranged to test the coupler under conditions as nearly like those in actual service as possible. The coupler should be located with the lip the standard distance from a rigid structure representing the dead wood or end sill. Between the back of shank and anvil block should be a spring similar to that used in service. The drop then falling on the coupler will compress the spring and bring the lip down sharply on the substitute dead wood and will subject the coupler to exactly the strain it would receive in actual service. In shop tests of couplers, it is found, as you say, that there is considerable bulging and bending of the shank. This is rarely, if ever, found as a result of service, as in service the shanks are generally found broken off quite square, and not bulged. This would tend to show that the strains produced in drop test, to test strength of shank, are very different from those occurring in actual service.

Once again, in regard to the advisability of shop coupler tests by railroad companies. I will say that with only the present proposed tests to make use of, I believe no general information can be obtained as to the essential features and vital points of the couplers. I believe a series of tests can be formulated which will be able to cover the strength of guard arm, the strength of shank, and the strength of the knuckle tongue under pulling shocks. Until such tests have been adopted as standards and have been proven reliable by their harmony with the results of actual service, I would advise railroad officers to base their opinions on comparative results from actual service, as may be best shown by 100 or more cars equipped with such couplers as are apparently of good practical design, and are known to be carefully inspected and tested by the manufacturers before delivery, and which conform to the M. C. B. lines and dimensions.

I will say further, that one of my conclusions named in your editorial, namely, that "the best results are obtainable largely from careful designing and a rigid inspection and test of material" is not at all in conflict with the recommendation to ascertain which design is best and which manufacturer makes the most rigid inspection and test by the results shown in actual service. If the *Railroad Gazette* knows of any one who is designing a coupler, based only on theory and the result of drop and pulling tests as now prescribed, and who disregards the more important results obtained from actual record of service, I will venture to predict for that designer and his coupler a sorry failure when the test of service comes. I cannot believe that any one would undertake so foolish a piece of work. It is to be sincerely hoped that the present M. C. B. Committee on couplers will modify some of the tests already prescribed so as to make them not too severe, but that they may do justice to all manufacturers and all kinds of metal used. Also, that they will so add to the tests as to show as far as possible which couplers have the strongest knuckles in pin holes and tongues, the strongest guard arms and the greatest strength in the shanks back of the head. Any wise conclusion that the Committee may arrive at in this direction will tend to make the shop tests of greater value, and will more fully harmonize theory with practice.

A. M. WAITT.

#### The Richmond Compound Locomotive on the Chesapeake & Ohio Railroad.

While building a number of standard 10-wheel freight engines for the Chesapeake & Ohio Railroad last year, the Richmond Locomotive & Machine Works arranged to give their new design of compound engine a practical test by making one of these engines compound, keeping the boiler and all the details exactly the same as the simple engines, except the cylinders. On the left hand or high pressure side the piston and piston rod, cylinder heads, steam chest and slide valve are all the same as the simple engine. On the right hand side the piston and piston rod, slide valve and steam chest are, of course, larger, but the guides and crossheads on both sides are exactly like the simple engines.

The action of the intercepting valve is automatic, causing the engine to start as a simple engine, and change itself into compound after the first few revolutions, unless it is desired to continue working simple, in which case a small lever *E* in the cab is pulled over by the engineer, which keeps the engine working simple as long as the lever is held in this position. This lever is attached to what is called the emergency valve, from the fact that it enables the engineer to convert the locomotive into a simple engine at any time, should it become necessary to overcome an extremely heavy pull of short duration, or start a very heavy train.

When the emergency valve is opened, live steam is admitted directly to the low pressure cylinder, and the exhaust from the high pressure cylinder is discharged into the stack through a separate emergency exhaust pipe which is not used at any other time. Should the engine become disabled it could by this means be worked as a single engine on either side, in case of breakage or accident to the other side, the same as an ordinary simple engine.

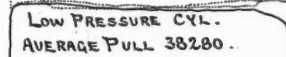
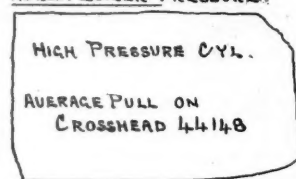
When working simple, either when starting automatically or by use of the emergency valve, the pressure of live steam in the low pressure cylinder is positively controlled at all times by an automatic reducing valve which never allows the pressure of steam in the low pressure cylinder to be more than  $\frac{1}{2}$  of the boiler pressure. The action of this reducing valve and emergency valve is clearly shown on the first pair of indicator cards, in which the dotted diagram shows the pressure in the low pressure valve chest with throttle full open and engine working simple.

The accompanying indicator cards show that in this engine the excessive compression which has given such frequent trouble in compound engines has been avoided without making any change in the arrangement of the link motion or making unusual clearances in either cylinder.

This engine has been in regular service since last September, and during all that time has been entirely in the hands of the railroad company's people, and has been used the same as one of their standard simple engines.

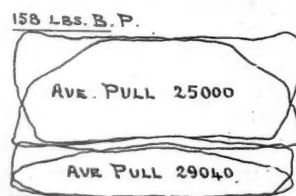
As the boiler was originally intended for a working

170 LBS. BOILER PRESSURE.



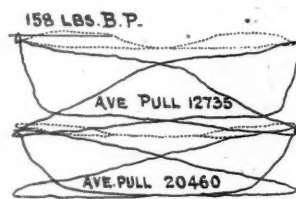
No. 1.

Engine working simple with throttle full open; same when starting automatically or using the emergency valve. Dotted lines represent diagram from low-pressure steam chest, showing action of the reducing valve.



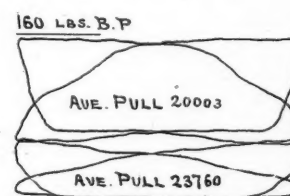
No. 2.

Engine working compound 90 revolutions per minute, 15.3 miles per hour.



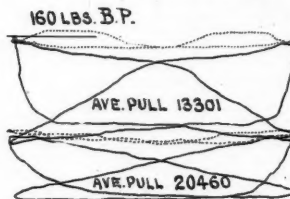
No. 4.

Engine working compound 174 revolutions per minute, 29.58 miles per hour.



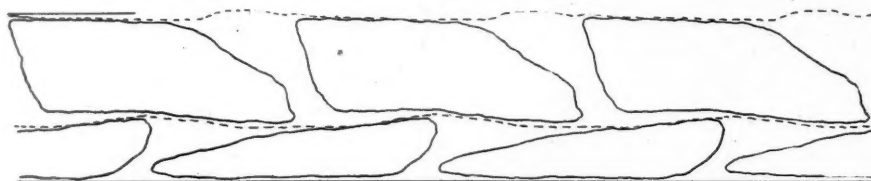
No. 3.

Engine working compound 120 revolutions per minute, 20.4 miles per hour.



No. 5.

Engine working compound 180 revolutions per minute, 30.6 miles per hour.



Relative position of high and low pressure diagrams in continuation. Dotted lines show diagrams from both steam chests.

Indicator Diagrams from Compound Locomotive No. 140, Chesapeake & Ohio Railway.

High-pressure cylinder, 19 in. diameter; low-pressure cylinder, 29 in. diameter; stroke, 24 in.

pressure of only 150 lbs., it has been considered advisable to carry not more than 170 lbs. during any of the tests. The tests were made in competition with a simple engine of the same class carrying the same boiler pressure as the compound. (The new Richmond compounds will carry 200 lbs. boiler pressure, which should show still better results.)

It was the prime object of the builders to produce an engine that would show as much economy in fuel as any other compound, and at the same time be entirely free from all objectionable mechanical features or complications. The following letter from Mr. William Garstang, recently Superintendent Motive Power of the Chesapeake & Ohio Railroad, now with the Cleveland, Cincinnati, Chicago & St. Louis, dated March 9, 1893, is attached to show how well the object of the builders has been carried out:

"Our two-cylinder compound engine No. 140 has been transferred from the Peninsular Division, and is now running in regular freight service on the James River Division of the Chesapeake & Ohio Railroad, between Richmond and Gladstone, a distance of 110 miles. The grades are such that the work is comparatively uniform and requires a steady pull over the whole line, in both directions.

"For some time past the compound engine has been running in direct competition with one of our 19x24 in. standard simple ten-wheeled engines. Both engines were built at your works and are exactly alike in all re-

spects, except that engine No. 112 is simple and No. 140 is compound. Both boilers are exactly alike and during the test both engines are carrying 170 lbs. pressure. The engines weigh about 118,000 lbs. in working order, 89,000 lbs. on drivers. Both engines have hauled the same sized trains, or as near alike as could be conveniently arranged for. Both engines have been under our control during the test, and the engineer of the compound engine had never handled a compound engine previous to last month, the mechanism of the compound engine No. 140 being so simple that it does not require any special training on the part of the engineer. I have before me the reports of the last 12 trips of both engines and find that the simple engine used 3.42 lbs. coal per car mile, and the compound 2.60 lbs., showing a saving in fuel of 23.97 per cent. in favor of the compound.

"The compound engine has proved perfectly reliable as far as we have gone with it, and I cannot see any reason to suppose that it will be any more expensive for repairs than a simple engine of the same class."

#### The Possibilities of High-Speed Electric Traction.\*

BY FRANK B. LEA.

Taking the subject of traction in general, there are a present perhaps three great divisions of speeds into which the traffic upon our steam roads may be separated—

1. Speeds up to 25 miles per hour, including nearly all goods trains, local and suburban trains, and the main line stopping trains.

2. Speeds of between 25 and 60 miles per hour, including express goods trains, local and main line passenger expresses and ordinary specials.

3. Speeds of over 60 miles per hour, a rate seldom attained except by limited expresses running over long distances, or "special" specials under favorable conditions.

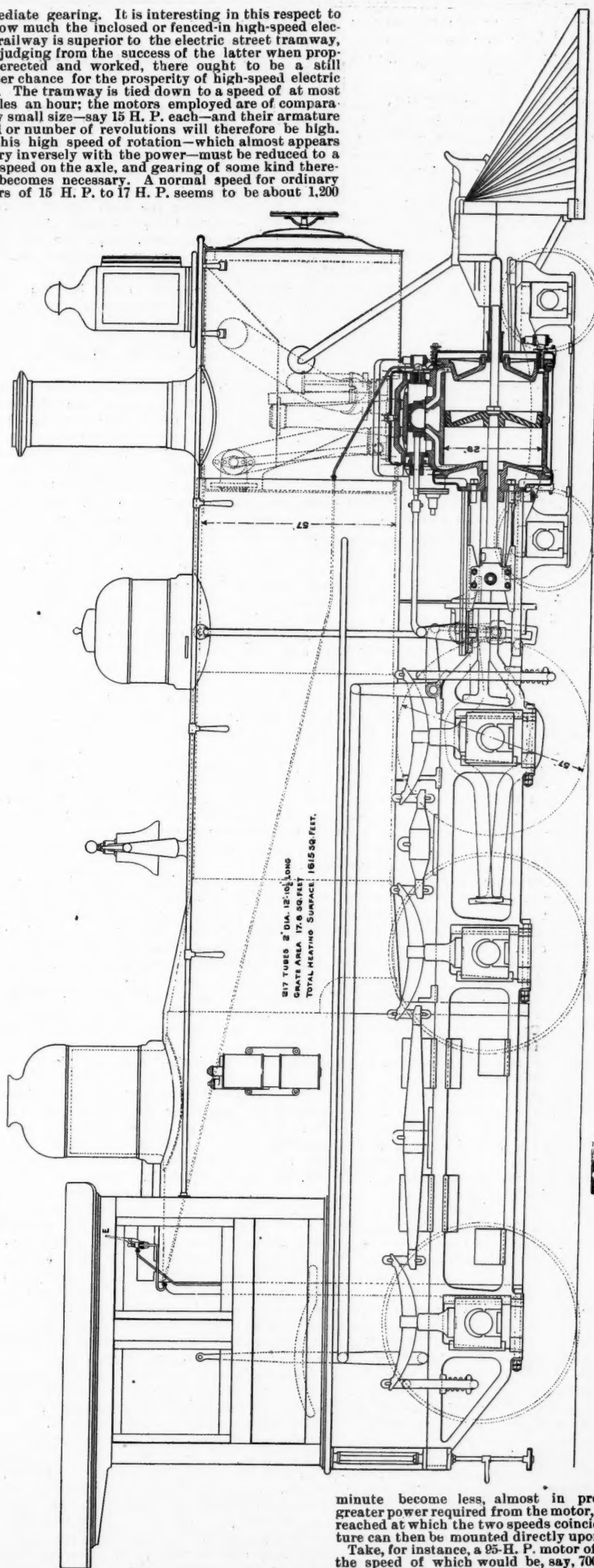
These speeds are all regarded as representing the average velocity from start to finish, and therefore include all stops and delays. In all probability they represent the utmost results that can be achieved on our steam railroads in practical every day working, and as they are at present constituted. Of course, one cannot say that a locomotive or a train is unable to attain a far higher speed than 60 miles per hour; as a matter of fact it will often require to run—and actually does run—at 70 or 80 miles per hour in order to maintain an average speed of anything over 60, inclusive of stops. There are, however, well-known practical limits to the speed of a steam locomotive and train, and if steam has thus apparently reached the limit of its usefulness, are we to go on with it contented with slight improvements from time to time, or will the demands of the traveling public for continually increased speeds become so urgent that the help of some agent other than steam power must be immediately sought out?

Does electric energy, in the first place, offer superior mechanical advantages for high-speed traction as compared with any other conceivable method? and in the second place, are these advantages obtainable at a comparative expenditure (both on capital account and maintenance) that will justify the employment of electricity as the tractive agent? . . . It should be said at the outset that electric traction will probably not do more in its present condition—so far as high-speed transit is concerned—than serve to convey extremely light loads, such, for instance, as express passenger traffic. The cost rendered necessary for the initial outlay and early maintenance of any such scheme is so great that only the best paying loads would at first be admissible. It is doubtful even whether electricity would care at the outset to rob the railways of that blessing in disguise (if they only knew it)—the Parliamentary train. The problem therefore resolves itself into a consideration of electric energy as employed to propel trains at an average velocity of, say, 120 miles an hour, as compared with the average of 60 now attained as a maximum by steam locomotives. There is not, of course, in existence to-day a single line where this speed is or can be obtained by electric traction; we can therefore only theorize from the knowledge and experience already acquired in electrical work, as well as from steam railroading.

Let us note the different conditions essential to electric rolling stock as compared with what is employed on steam roads. First, we get rid of all reciprocating motion at once: the rotating armature of the electric motor is mounted directly upon the car axle without any in-

\* Extract from a paper read before the Owens College (Manchester, Eng.) Engineering Society, March 14, 1893.

intermediate gearing. It is interesting in this respect to see how much the inclosed or fenced-in high-speed electric railway is superior to the electric street tramway, and, judging from the success of the latter when properly erected and worked, there ought to be a still greater chance for the prosperity of high-speed electric lines. The tramway is tied down to a speed of at most 10 miles an hour; the motors employed are of comparatively small size—say 15 H. P. each—and their armature speed or number of revolutions will therefore be high. Yet this high speed of rotation—which almost appears to vary inversely with the power—must be reduced to a slow speed on the axle, and gearing of some kind therefore becomes necessary. A normal speed for ordinary motors of 15 H. P. to 17 H. P. seems to be about 1,200



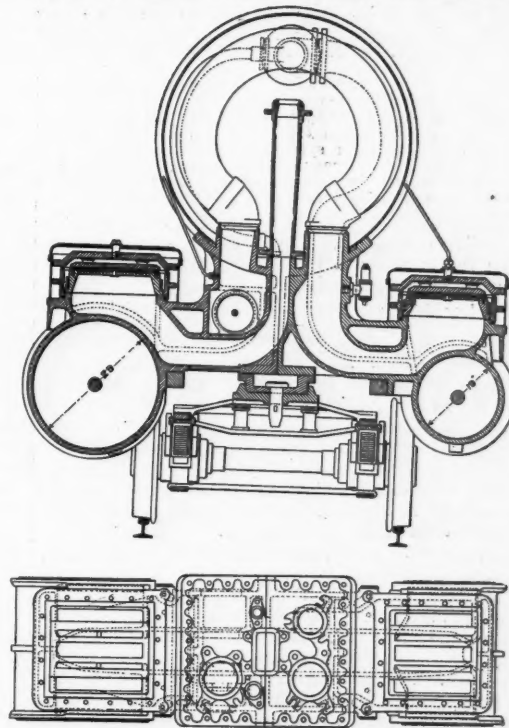
COMPOUND FREIGHT ENGINE FOR THE CHESAPEAKE & OHIO RAILWAY—CYLINDERS, 19 IN. AND 29 IN. X 24 IN.

Build by the RICHMOND LOCOMOTIVE AND MACHINE WORKS, Richmond, Va.

ers, with motors mounted on the axles, running at 170 revolutions per minute. An output of at least 1,500 H. P. is specified, so that a speed of 30 miles per hour may be maintained even on up grades.

Some emphasis may, I think, be properly laid upon these details, if only to show the advantage in high-speed electric traction of doing away with the inefficient and wasteful gears that are essential to slower traffic, but which do not, however, seem to prevent the latter from reaching a practical success.

Instead of taking place at all times on each engine, the generation of power is transferred to a fixed station, the details of which will be gone into by and by, and the locomotive, with its tender, mounting up to at least 50 tons (and probably nearer 80 tons) in weight, only one-third of which may perhaps be available for adhesion purposes, is replaced by electric motors of great efficiency, every ounce of whose weight acts beneficially in the way of spreading the adhesion weight throughout the train. Not only is the weight more evenly placed in this manner throughout the train, but it is possible to obtain a greater proportion of driving wheels, and therefore a much steadier motion, both at starting and when running. The adhesion weights and the points of applying the driving power are better distributed in an electric train than on a steam road. As an instance of this may be cited the Caledonian express engines, running the Scotch traffic between Carlisle and



Edinburgh during the race five years ago. In working order, engine and tender weighed 75 tons loaded, and the average train about 148 tons additional, or a total of, say, 221 tons. Out of this only 17 tons, or one-thirteenth of the total weight, were available for adhesion, the engine being a single driver with 7-ft. wheels.

Compare this with the Liverpool Overhead Railway, where the motors are mounted directly upon the car axle, so that the whole of the weight is available for adhesion: out of the total weight of, say, 40 tons for each train of two cars, probably six tons would represent the weight of the motors. This is nearly one-sixth of the total, and is twice as much in proportion as with the Scotch express. With a current of 80 amperes, indicating about 50 H. P. each, these motors would have a torque of about 1,000 lbs., or, say, one-sixth the adhesion weight, so that there would be no fear of their slipping. It is doubtful whether the steam locomotive would start or run uphill without a continual use of the sand-blast; for taking the mean effective cylinder pressure to be 120 lbs. per square inch, the tractive force would be nearly one-third of the available adhesion weight.

There are, however, some other considerations which require dealing with before we can imagine mighty improvements, and these considerations touch largely upon the matter of cost, both in first outlay and working charges. At the outset it must be admitted that absolutely new lines would be required for high-speed electric traction after the manner proposed; the railroads at present employed for steam locomotives would obviously prove quite unsuitable, not only because of heavy gradients or sharp curves and possible danger from junctions and other crossing points, but principally by reason of the less rapid traffic, which must be accommodated in some way and which can hardly be turned off altogether, in order to keep the lines absolutely free for the lightning expresses. It is conceivable that a steam locomotive might run a train—though, perhaps, not very efficiently—at 100 miles an hour on roadbeds of the ordinary English type; but such a speed could not be kept up for any distance, for the most probable reason that there would be a coal train in the way. However, this is by the way; the necessity of new roads for high speed being admitted gives at once the crux of the whole question, for it is useless incurring heavy expenditure on this account unless there is a reasonable expectation of a continuous traffic at remunerative rates, however well worked out the mechanical details may be. . . . Then, again, it appears self-evident that any line for high-speed traffic must of necessity have considerable length; to begin with, it would hardly seem worth while going to great expense in order to save half an hour or an hour's time. It is when we come to the long journeys of 250 miles and over that a real saving in time is effected. . . . It will be seen from these two facts regarding the line for high-speed traction—first, its special nature and construction; second, its length—that the amount of capital required for this purpose alone would be very considerable.

There are many points of detail which could be enlarged upon in connection with the line itself, or permanent way. Thus, for instance, it is a moot question not yet decided—from the very nature of things—as to whether trains of any form or shape will travel safely

revolutions, though of course a special design of machine will give slower speeds than this with proportionally increasing weights. It is not desirable to carry too much dead weight, and the tramway engineer has therefore hit the happy medium between excess in weight and excess in speed. In any case, however, it is pretty certain that motors coupled directly to the tram-axles, without the intervention of gearing, would be very inefficient.

Taking the diameter of car wheels to be 28 in. and the maximum speed 10 miles per hour, the axle revolutions are 120 per minute, so that a 10 to 1 gearing is necessary with the ordinary motor. With fast-running trains, however, on an inclosed line, not only does the axle speed increase, but the armature revolutions per

minute become less, almost in proportion to the greater power required from the motor, so that a point is reached at which the two speeds coincide, and the armature can then be mounted directly upon the car axle.

Take, for instance, a 25-H. P. motor of ordinary design, the speed of which would be, say, 700 revolutions per minute. A car with 6 ft. driving wheels would give at a velocity of 150 miles per hour exactly the same speed; or take—as is proposed for the rapid transit line between St. Louis and Chicago—motors of 200 H. P. with armatures running at 500 revolutions per minute. If these motors are mounted on car axles, with driving wheels 7 ft. in diameter, a speed of 120 miles per hour would be attained by their use.

This great adaptability of electric motors to a direct coupling, or mounting upon the driving axle when run at high train speeds, or with considerable output, is shown even at such a low velocity—comparatively speaking—as 30 miles per hour. The electric locomotives to be employed in carrying the Baltimore & Ohio main line traffic through the long tunnel now in course of completion under the former city are to have 5-ft. driv-



at 120 miles per hour upon a couple of rails. . . . Another point to be discussed is as to whether, with a double line of rails, the intervening space, or "six-foot way," would require to be considerably more than the regulation distance. The windage of two trains of a given size meeting at 120 miles each may be calculated out by our mathematical friends, and a proper value given to the horizontal component of the air-churning. It might prove large enough to warrant a greater space between the rails in order to reduce the effect. This, of course, involves an increased width of line, and therefore a greater outlay unless the line be under ground.

In conclusion, what are the results to which we have been led? The problem we set out to discuss was twofold: first, has electricity as a tractive agent superior advantages in a mechanical sense compared with the most improved use of steam for high speed traction? and, second, is high speed electric traction capable of development on as und commercial basis—that is, in common language, can it be made to pay? The first question may be answered, I think, with a decided "yes"; the second with a very qualified affirmative. It is only under special conditions, where there is much intercourse between places at a great distance—i. e., at least 250 miles apart, and where natural obstacles do not entail too great an expense—that a line of this kind will at the outset yield sufficient to repay the necessary first cost. As time goes on, however, the increase of communication would act and react until even short lines of, say, 50 miles or so might prove very profitable, especially if by reason of still greater efficiency in the mode of generating electric energy its cost could be reduced to a fraction of its present amount. As soon as goods trains and heavy traffic in general can be worked as cheaply by means of electric traction as now is done by steam locomotives, there can be no doubt that the former system will come into universal employment. At present, however, electric energy cannot be obtained cheaply unless it be used continuously, unless the station is at full load all day long, a contingency not likely to happen until the whole of the traffic, goods and passenger, is worked by it. The result is somewhat of a deadlock, but there is no doubt that the matter will right itself in time, as already pointed out.

#### Local Transportation to the World's Fair.

World's Fair transportation matters in Chicago are by no means settled. Estimates of the carrying capacity of some of the local companies which were made last year when the World's Fair was being pushed are now known to have been considerably exaggerated. Apparently but few of the roads will run into the grounds and transportation will resolve itself into the carrying capacity of the Illinois Central, the Alton, the elevated, the South Side cable roads, the lake steamers, and miscellaneous vehicles drawn by horses. The location of the transportation lines is given on the map of the city accompanying this article.

It is probable that but few of the roads reaching the city from the north and west will attempt to run local excursion trains to the Fair grounds, because of the time required to make the transfer and run from the city to the Park. The distance is about 10 miles and the time required will be, in some cases, not less than 1½ hours. Roads reaching the city from the east and south will be able to make satisfactory connections with the terminal provided by the Exposition authorities.

All roads running into terminal stations of their own have made considerable improvements for handling the expected increase in traffic. The Union depot, which is used as a terminal for the Chicago, Milwaukee & St. Paul, the Pennsylvania lines, the Chicago & Alton and the Chicago, Burlington & Quincy has been extensively remodeled.

**Chicago, Milwaukee & St. Paul.**—The Chicago, Milwaukee & St. Paul Railroad will not run its suburban trains into the Union station during the time the Fair is open; its track facilities for reaching this station are somewhat limited and it has been thought best to withdraw the suburban terminal to the corner of Kinzie and Kingsbury streets, where a large suburban station has been erected. Through trains will run to the Union depot as usual.

**Chicago, Burlington & Quincy.**—The Chicago, Burlington & Quincy at one time considered the advisability of making Harrison street its terminal for suburban service, but it has been decided that with the Union depot terminals in their present conditions all traffic can be satisfactorily handled. The schedules for running trains for the summer have not been prepared, but in making them up care will be taken to so arrange times of leaving and arriving as to interfere in no way with regular suburban service.

**Chicago & Alton.**—In anticipation of a large World's Fair traffic the Chicago & Alton Railroad Company has double-tracked and ballasted with stone its line from Chicago to Bloomington. No attempt will be made to reach the Fair grounds, but all trains will be run to the Union depot, as it is not expected that any important change will be made in the regular time-table. Additional locals will soon be put on, and the runs of a number of accommodation trains will be extended. Excursion trains will be run as required, and regular trains will be run in sections. This road has lately purchased 12 large engines and 30 first-class passenger coaches with a seating capacity of 60 persons, also a number of baggage cars.

**Pennsylvania.**—No definite arrangements have been concluded by the Pennsylvania for handling its traffic. Its facilities for reaching the Fair grounds with excursion trains are very good. Circulars have been issued by the Illinois Central and by the Baltimore & Ohio and the Chicago & Northern Pacific lines to the Pennsylvania and other roads offering the use of their tracks to companies desiring to reach the grounds. Either route is available to the Pennsylvania, although

that offered by the Illinois Central is probably the best one as it gives a shorter haul. It is safe to say that all necessary measures will be adopted for keeping the service up to the standard of the company.

**The Chicago & Northwestern.**—The Chicago & Northwestern Railroad Company has made no preparations for running trains to the Fair grounds. Extensive improvements have, however, been made in the yards of this company and in its station at the corner of Wells and Kinzie streets. Two additional tracks have been added to the station terminals and the tracks relaid and ballasted with stone. A new stairway leading from the waiting room to the platform has been put in. The main stairway has been rebuilt and a new entrance with a canopy built on Kinzie street. Besides this the station is being newly decorated inside and painted outside. The restaurant has been enlarged, as have also the express and baggage rooms. The lighting of the depot yard and the heating and lighting of the station will be from the new electric light plant described in the *Railroad Gazette* of Jan. 27, 1893. The passenger yards have been equipped with pneumatic interlocking, and pneumatic block signals have been installed between the station and West Fortieth street, on the Galena Division, and as far as Deering on the Wisconsin Division. The movement of trains within suburban limits will be controlled by the Hall system of block signaling, which has been put in from West Fortieth to Turner, on the Galena Division, between Clybourn Junction and Barington, on the Wisconsin Division, and from Deering to Waukegan, on the Milwaukee Division. The work of double tracking the line from Chicago to Milwaukee is nearly completed. The company has also erected new coach yards at Ada street and enlarged its plant for the manufacture of Pintsch gas. During the past year 169 first-class passenger cars, 20 chair cars, 18 accommodation cars and 6 parlor cars have been ordered. The company has also bought 52 new engines.

**The Chicago & Northern Pacific, Wisconsin Central and Baltimore & Ohio.**—The Chicago & Northern Pacific and Baltimore & Ohio railroads have made preparations to do a suburban business over the lines of these companies between some point not yet determined on the lines of the Wisconsin Central Railroad and the World's Fair grounds. In view of the fact that this service has been promised, there is now quite a demand for rooms and houses during the World's Fair period in the suburban towns on the west side along the line of the Wisconsin Central. No trains will be run by these companies between their Harrison street station and the World's Fair grounds on account of their disadvantage in having to go three miles to the west in order to reach the grounds. This service will in no way interfere with the regular suburban service between Harrison street station, Blue Island avenue and towns along the line of the Chicago & Northern Pacific and its leased lines. One hundred suburban cars, of a type somewhat similar to the car designed by the Illinois Central Railroad Company for World's Fair service, have been ordered and are now under construction. Fifty of these will be from the shops of the Wisconsin Central Railroad Company at Stevens Point and 50 from the South Baltimore Car Works, at Baltimore. The time-table for this service has not been arranged owing to some litigation between the Baltimore & Ohio Railroad and a lumber firm in South Chicago. Condemnation suits have been instituted by the Baltimore & Ohio against this lumber firm for the ground necessary to put in a Y connecting the tracks of the Chicago, Rock Island & Pacific Railroad and the north bound tracks of the Baltimore & Ohio. The construction of this Y will greatly facilitate handling trains in South Chicago. The tracks over which these trains will run are as follows: Leaving the main tracks of the Chicago & North Pacific at Ogden avenue trains will run over the tracks of the Chicago Central as far as Forest Hill. From this point the Baltimore & Ohio has built tracks parallel to those of the Pittsburgh, Cincinnati, Chicago & St. Louis to a point opposite Brainerd, where the tracks of this road are crossed, and connection is made with the tracks of the Chicago, Rock Island & Pacific road, over which trains will run as far as South Chicago. From South Chicago trains will run over tracks formerly used by the Baltimore & Ohio as far as Seipp avenue, along which tracks have been laid north to Jackson Park, connecting with the terminal system provided by the Exposition authorities.

In addition to these local suburban trains, excursion trains will be run from points along the Wisconsin Central line as required, and will be run to the Fair grounds instead of to the Grand Central Station. The frequency of these trains has not been determined, but it is expected to run as many as are needed to accommodate those along the lines. Whether or not this service can be made satisfactory remains to be seen. In view of the great number of grade crossings on this line numerous delays must be expected. It will be observed from the map that this route crosses the line of almost every railroad entering Chicago. If this local service can be made successful it will offer a convenient means for people living on the West Side to reach the Fair grounds without the delay and expense incident to making a transfer in the city at times when the crowd is greatest.

**Chicago, Rock Island & Pacific and Lake Shore & Michigan Southern.**—The capacity of the terminal station of the Chicago, Rock Island & Pacific and the Lake

Shore & Michigan Southern railroads at Van Buren street has been increased by changing the terminal tracks so as to have three sets of two tracks instead of two sets of three tracks each. This practically increases their facilities for handling passengers about 50 per cent. Through trains will be run to this station over the lines of both roads. Excursion trains may be run to the Fair grounds. The Lake Shore & Michigan Southern would probably use the tracks of the Illinois Central Company from Grand Crossing, where suitable connections have been made, to Seventy-first street, where a Y has been put in, connecting the main line of the Illinois Central with the South Chicago branch. At Seipp avenue a track, running north, parallel to that of the Chicago & Northern Pacific, has been put in connecting the Illinois Central with the World's Fair terminals. No arrangements have been made by the Chicago, Rock Island & Pacific Company for running excursion trains to the grounds. It will be seen, however, by reference to the accompanying map that this company can easily make connections with either of the routes to the grounds if desired.

**The Chicago & Western Indiana.**—The Chicago & Western Indiana is also in a position to offer facilities for handling trains to and from quite a number of railroads. Extensive improvements have lately been made on this company's property in the city. Its four-track system has been extended from Dearborn Station to the State street crossing, a distance of about 10 miles. Extensive passenger yards have also been put in at Eighteenth street, and the tracks at Dearborn Station have been rearranged to facilitate handling passenger equipment. The baggage facilities have been more than doubled, and the capacity of the waiting room has been increased about 75 per cent. The old ticket office has been converted into a parcel room. The Pullman ticket office will be enlarged and the restaurant placed in the basement. An electric plant is to be put in, which will not only light the station and station sheds with arc and incandescent lights, but will also light the road from Dearborn Station to Twenty-second street.

**The Chicago & Eastern Illinois and the Chicago & Grand Trunk.**—The Chicago & Eastern Illinois and the Grand Trunk railroads are using the terminal of the Chicago & Western Indiana road, and will have no difficulty in transferring excursion trains to the Fair grounds if desired. These roads will probably not attempt to run suburban trains between this station and the grounds. The Chicago & Eastern Illinois has during the past year or two made extensive additions to its equipment and has double tracked its line as far south as Danville, about 130 miles.

**The Wabash.**—The Wabash Railroad has made no arrangements for running suburban trains between its station and the Fair grounds. Excursion trains from points outside of Chicago will be run as found necessary to accommodate those wishing to visit the Fair, and will probably be transferred over the lines of the Belt Railway or Illinois Central.

**The Atchison, Topeka & Santa Fé.**—The Atchison, Topeka & Santa Fé will probably run trains only to the Polk street station and make no attempt to reach the Fair grounds.

**The Illinois Central.**—The Illinois Central Railroad Company has, as is well known, made very extensive improvements on its property in the city during the past year. A new passenger station has been erected at Park Row and was opened April 17. This will be made the terminal of all through trains. This station was illustrated in the *Railroad Gazette* of Oct. 14, 1892, and also last week. Besides this the tracks have been elevated for some distance north and south of Jackson park with suitable bridges over the various street crossings. The company has eight tracks between the city and Sixty-seventh street, two of which will be devoted exclusively to World's Fair trains, two are reserved for the regular suburban service, two for passenger service, and the remaining two for freight. This road will probably reach the capacity claimed for it some time since, but a majority of the visitors using this line will not be landed in the grounds although tracks are laid to the grounds. A large station will be built near the Midway Plaisance for the accommodation for the World's Fair traffic. The regular suburban service of this company will in no way be interfered with by World's Fair traffic. The terminal for regular suburban trains will, as heretofore, be Randolph street. For the World's Fair service 300 cars have been built. These were illustrated in the *Railroad Gazette* of Aug. 26, 1892. A number of engines have been built and several remodeled. The company will have for the handling of suburban and World's Fair traffic about 450 cars and 75 engines. The World's Fair specials, as perhaps they may be called, will consist of 10-car trains with a seating capacity of 96 persons per car, and can be run at intervals of about two minutes. A shorter interval than this is out of the question, as it will be very difficult to load and handle trains on this line near the Park at less than a two-minute interval. For a shorter interval the Hall signal system, which the company has lately put in, would have to be disregarded, as it is based on a minimum interval of two minutes. It will be seen that the maximum capacity of this service is about a thousand per train, or 30,000 passengers each way every hour. These trains will make no stops between Van Buren street and Jackson Park. For the accommo





- |                              |                           |                                    |                          |                                      |
|------------------------------|---------------------------|------------------------------------|--------------------------|--------------------------------------|
| 1. Post Office.              | 3. Grand Central Station. | 5 and 6. Illinois Central Station. | 8. Union Station.        | 10. Down-town Station—Alley Elevated |
| 2. Van Buren Street Station. | 4. Polk Street Station.   | 7. Chicago & Northwestern Station. | 9. Jackson Park Station. | Railroad, Congress Street.           |

CHICAGO AND VICINITY—SHOWING TRANSPORTATION ROUTES TO THE WORLD'S FAIR GROUNDS.

dition of the regular suburban passengers and those living between Van Buren street and the Park, the regular suburban service of the company will be available, but all suburban trains will be run at intervals of five to ten minutes. This last condition raises grave doubts about the utility of this road for conveying passengers except from its new station at Park Row, and it remains

to be seen whether those living south of Van Buren street station will be able to reach the Fair grounds by this or any other route, as it is probable that the local trains as well as the World's Fair through specials will be filled before leaving the city. In this connection it must be remembered that the street railroad lines promise very little accommodation except at certain points

The capacity of the Illinois Central suburban service for handling passengers between the city and the park will probably not be over 10,000 an hour. Excursion trains over the lines of the Illinois Central from local points outside of the city will probably stop at the Fair grounds and will thereafter go on to the city. Through trains, however, will make no stop at the grounds.

**Michigan Central.**—The service of the Michigan Central Railroad will be only through trains, and will be handled within the city limits in the same manner as the through trains on the Illinois Central. This road has, in anticipation of a large World's Fair traffic, built during the past few months over 100 cars and about 40 locomotives. It is the intention to maintain a strictly first class service, and all immigrant service will be discontinued.

**The Alley Elevated.**—The lines of the Chicago & South Side Rapid Transit Railroad Company are now nearly completed between Congress street and Jackson Park. This road will land its passengers inside of the grounds at the terminal station upon the roof of the Annex of the Transportation Building. The estimates of the carrying capacity of this road, as previously given, are too high. With the terminals as they are now being built the road would have a capacity of more than 40,000 passengers an hour in each direction, with trains running on an interval of one minute, which is not too small an interval for safe operation, as is shown by the work on the Manhattan roads in New York City. The road has, however, failed to make adequate provision

in the way of equipment, and it is generally understood that it will purchase no additional cars for World's Fair traffic. This will reduce the capacity of the road to about 12,000 an hour in each direction. Such a short sighted policy is much to be regretted, as the down town hotels and the trunk lines entering down town stations have relied on this road to get passengers to the Fair. As it stands now, passengers over the St. Paul, Northwestern, Burlington, Alton, Pennsylvania, and some other prominent roads, will land about all of their passengers at the down town stations and such few of these passengers as are fortunate will be enabled to procure cabs to cross the city at exorbitant rates.

**South Side Cable Roads.**—The Chicago City Railway Company is fitting up its cross town lines at Thirty-fifth, Forty-seventh and Sixty-third streets to be run by electricity. The Thirty-fifth and Forty-seventh street lines will probably not affect the problem of transportation to and from the World's Fair. The Sixty-first and Sixty-third street lines will transfer passengers from the State street line and the Oakwood branch of the Cot-

tage Grove avenue lines to the Fair grounds. The total number of passengers carried by this company on Oct. 23 of last year, at the time of the dedication of the Exposition, was 600,000. At that time the company had only its regular gripmen and was using but one equipment. It expects, however, to use during the coming summer both its summer and winter cars and to largely increase its



force of gripmen and conductors. It estimates an increase in capacity of at least 50 per cent. The number of passengers carried by the Cottage Grove avenue line alone in October of last year was 300,000; this, of course, includes the regular patrons of the line. The regular trains will consist of a grip and two cars. It is not expected to run four-car trains as is now largely done on the North Side lines. These trains the company expects to be able to run at intervals of one-half minute and to make a round trip on the Cottage Grove avenue line in two hours. This line has a loop at each end. The State street line has no loop at Sixty-third street; it will use the switchback, but it is practically impossible to run trains on this line at so close an interval as one-half minute. As for running trains at this interval on the Cottage Grove avenue line the probability is that it will be found very difficult. Progress will necessarily be slow on account of the great number of teams on the streets, both at the lower end of the line and also in the city. In order to keep up this interval of one-half minute a great number of trains will necessarily be on the loops and the consequent strain on the cable very great. The capacity of the road would unquestionably be enormous if the cable trains had a right of way through the streets, but this is not the case, even now, and will most certainly not be the case next summer, when the streets all along the lines of these roads are filled with vehicles of all kinds. The result will be that the cable trains, at a maximum speed of 14 miles an hour across and through crowded streets, will be slowed and stopped so frequently that their carrying capacity will be greatly reduced. Those who have watched the developments of these transportation matters are of the opinion that cable roads will have a hard time of it this summer, and more will be learned about the feasibility of operating cable roads in crowded streets than has ever been known before. Fortunately many people will have rooms within two or three miles of the Fair grounds, and there will undoubtedly be a large number of vehicles which will be available within these short distances.

**The Horse and Electric Lines.**—The street car lines will be of but little value, except in transferring passengers across town from station to station, as the proposed omnibus service is wholly inadequate for this work. The majority of passengers will therefore have to walk to the Illinois Central station in order to reach the south part of the town. This distance varies from one mile to one and one-half miles, and will be a hardship to a great many people. If these patrons could be carried by the elevated road and the Illinois Central Railroad after crossing the town, the condition would be better, but the elevated road has such a small capacity that it will be practically of no value in assisting the movement of crowds. The cable lines will be filled to overflowing with the ordinary city travel and the travelers from the down-town hotels and boarding houses. The filling of the cable trains will take place before they pass around the down-town loops. The only possible relief for the cross-town lines is to provide steamer transportation from the lake ends of such lines. People living as far south as Twenty-second street are beginning to realize that there is no possibility of their getting a seat or even a chance to stand on cable trains going south, and many have expressed the intention of taking the cable train going north, when comparatively empty, and riding around the loop, paying two fares to reach the grounds. In this way all travelers and even down-town hotel visitors will find cable trains filled going south by passengers entering the trains going north before reaching the down-town loop.

The visitor to Chicago this year who lives in suburban districts will have a hard time of it in getting to the World's Fair grounds, as he will have to enter the city at one of the down-town main stations and walk across the city and take his chances with many others in getting a ride on the Illinois Central or the lake steamers.

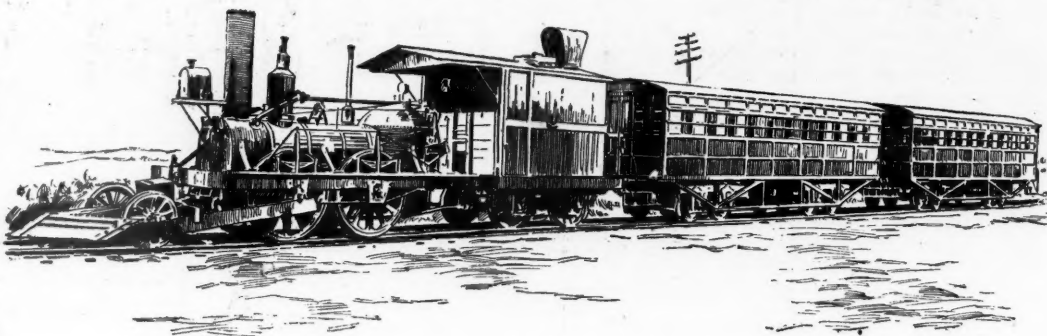
**The Lake Steamer Lines.**—The World's Fair Steamship Company has made quite extensive preparations to run boats between the fair grounds and the city. Its landings in the city will be at East Chicago avenue, at the mouth of the Chicago River and at Van Buren street. At Van Buren street a large pier has been erected, and a viaduct leading to it above the Illinois Central tracks is now being constructed. The largest vessel to be operated by this company is the "Christopher Columbus," a whaleback built for this purpose at West Superior, with a capacity of 5,000 persons. The number of vessels controlled by this company is constantly being increased. It now claims a capacity of 30,000 people each way per hour between the city and the park, and negotiations are pending for the use of more steamers. The estimated time required for a trip between the city and the park will be about 55 minutes, including time for loading and unloading. The charter of this company gives it the sole privilege of carrying passengers between the World's Fair docks and points within the city. Vessels from outside the state will, however, be permitted to land at these docks. Besides the World's Fair docks, there are docks north of the grounds at which vessels plying between the city and the park may land. It is not probable, however, that these outside docks will very much affect the problem of World's Fair transportation.

Taking all together, the situation for transportation from the downtown districts to the Fair grounds is in

some respects unpromising. It is evident that the maximum capacity of the Illinois Central Railroad is about 40,000 an hour. The capacity of the elevated line is in the neighborhood of 12,000 an hour. With an interval of one minute, which is probably as close as cable trains on the Cottage Grove avenue line can run, the capacity of that line would be about 15,000 people an hour. The capacity of the State street line will be less than this, for several reasons. The capacity of the line is limited by reason of the company being unprovided with a loop at Sixty-third street; the Sixty-first and Sixty-third street electric lines will be unable to handle the passengers transferred from the State street lines. The utmost capacity of this line is probably not over 10,000 an hour. As before stated, the ability of the Chicago & Northern Pacific to satisfactorily handle the traffic from the west side is highly problematical. There can be no doubt that their traffic will be very large if they are able to successfully cope with the conditions to be met. The total estimate lately made by Mr. Higginbotham, of 110,000 an hour, is not far from correct, although the stated distribution of the traffic was undoubtedly incorrect. The number of passengers who will have rooms in the vicinity of the grounds and will go there on foot, and the number that will be handled by the Calumet Electric Railway, is very uncertain. Whether or not the total carrying capacity of all transportation lines is sufficient can only be determined by trial as much will depend on the distribution of the visitors throughout the city. One thing is sure, and that is that the suburban population from west and north of Chicago will, have much trouble in reaching the World's Fair grounds, as they will generally have to use two lines of transportation and walk from 1 to 1½ miles. If there is as much rough water on Lake Michigan this summer as there sometimes is, the lake traffic will be much interfered with, and, further, the steamer route to the grounds is a new one and there will be many boats running, and so much competition that collisions of steamers may result; one accident of this kind would make lake transportation very unpopular.

#### The "John Bull" Train on the Pennsylvania.

Last Monday morning a very remarkable passenger train left the Pennsylvania station at Jersey City for



The Pennsylvania's "John Bull" Train on the Way to the World's Fair.

Chicago. It consisted of the locomotive John Bull and two passenger cars from the earliest equipment of the Camden & Amboy Railroad. The train was to run through to Chicago under steam, and the schedule (a good deal condensed) was as follows:

Monday, April 17—New York, 10 a. m. Arrive Philadelphia, Broad street Station, 4:40 p. m.; leave 6:46 p. m.  
Tuesday, April 18—Arrive Harrisburg, 2:15 a. m.; leave, 7 a. m. Arrive Altoona, 4:45 p. m.; leave 6 p. m.  
Wednesday, April 19—Arrive Pittsburgh, 5:25 a. m.; leave Pittsburgh, Central time, 8 a. m. Arrive Orrville, O., 6:35 p. m.  
Thursday, April 20—Leave Orrville, O., 8 a. m. Arrive Lima, O., 7:30 p. m.  
Friday, April 21—Leave Lima, O., 8 a. m. Arrive Plymouth, Ind., 6:35 p. m.  
Saturday, April 22—Leave Plymouth, Ind., 8 a. m. Arrive Chicago, Ill., 3 p. m.

It was a matter of a good deal of conjecture whether or not the schedule could be kept, or the locomotive could be run through to Chicago at all. Wednesday afternoon at 1:20 o'clock, the train was on time at Leetonia, Ohio. The engine had been overhauled at the Meadows shops of the Pennsylvania, under the direction of Mr. Hayward, and he was very confident that it could not only run to Chicago with its train, but could run six months continuously, if necessary. New tubes have been put in and the boiler has been tested to 120 lbs., and carries 100 lbs. The engine is, however, essentially the original John Bull as imported in 1831 for the Camden & Amboy Railroad & Transportation Company. It was built by George and Robert Stephenson at Newcastle-on-Tyne, and arrived in Philadelphia in August, 1831, and was transferred to Bordentown, N. J., Sept. 4, 1831. The original dimensions of the engine were: Cylinders, 9 in. diameter by 20 in. stroke; one pair drivers, 4 ft. 6 in. diameter, and one pair wheels not coupled, of the same diameter. The hubs were of cast iron, spokes and rims of wood, tires of wrought iron, and the total weight was about 10 tons. The engine was first put under steam Sept. 15, 1831, and the first public trial was made Nov. 12 of the

same year, Isaac Dripps acting as engineer, Benjamin Higgins as fireman, and R. L. Stevens, the founder of the Camden & Amboy Railroad, as general instructor and conductor.

The John Bull remained at Bordentown until 1833, the road being worked by horses up to that year. Then steam locomotion was adopted and the John Bull ran in regular service until 1836. The engine was considerably modified, but we are told that she appears now as she ran in 1836. In 1876 the engine was refurbished up and exhibited at the Centennial in Philadelphia, and in 1883 it was shown at Chicago at the Exposition of Railway Appliances; then the Pennsylvania Railroad Company presented it to the United States Government for the National Museum at Washington, and the company has now borrowed it from the government for the World's Fair at Chicago. The present weight of the engine is 22,000 lbs. in working order, and of the engine and tender 32,000 lbs.

The two passenger coaches are of the original rolling stock of the Camden & Amboy, having been built in 1831. As they appear now, they have been, of course, a good deal restored. The frames and most of the woodwork, and nearly all of the iron work are, however, the original material. The seats are new but carefully copied from an old one which was in existence, both as to size, shape and upholstery. The floors are new, as are the wheels and axles. We are told that one of the trucks was found in a marl pit in New Jersey. The cars are 30 ft. long inside, 6 ft. 6 in. high in the middle, 5 ft. 8 in. at the eaves, and each one has seats for 48 persons, but we are bound to say that the seats are exceedingly narrow and uncomfortable. Mr. Forney, who rode some way with the writer of this, thinks that they are very much like the Hale & Kilburn seat. We should be reluctant, however, to enter into any comparisons.

Over the New York Division the train was in charge of Mr. W. T. Bailey, who is the oldest passenger conductor on the road and has had 35 years of active service. The gig top on the back of the tender was occupied by Mr. Jonas Hager as brakeman, who held the same position in 1849. Mr. Thomas Gallagher acted as rear brakeman, in which capacity he also had served in 1849. The engineman was Mr. A. S. Herbert, who ran the John Bull 40 years ago and has been running an engine ever since. Mr. J. W. Sanford, who fired, began his

railroad life as fireman in 1855 and is now Master Mechanic at the Meadows shops.

The popular interest displayed in the passage of this train seemed really remarkable. At all the towns and villages the crowds collected were very great, and it was especially gratifying to see the great numbers of school children, who had evidently been let out to give them a chance to see the old train go by. If the train gets through to Chicago without killing any of the enthusiastic lookers-on it will be a great piece of luck, or perhaps we should say, a great triumph of good management.

Of course the reader of the *Railroad Gazette* who is at all interested in such historical matters knows that the John Bull was neither the first locomotive run in the United States nor the first one imported from England; but it is believed to be the oldest locomotive now in existence in the United States, for the restorations have been so few that we may say that this engine is the original John Bull and is not a copy or model built to show what the John Bull was like. As we have stated, this engine was brought to the United States in 1831; but the Stourbridge Lion, built by Foster, Rastrick & Co., arrived in New York in May, 1829, and was tried by Mr. Horatio Allen in August of that year. An excellent picture of this engine may be seen in the *Railroad Gazette* of March 31, last, that being from a photograph of the Angenorica, which was built at the same time as the Stourbridge Lion and of the same pattern. Peter Cooper's experimental engine Tom Thumb was also built and tried in 1829. This was built at the St. Clair Works near Baltimore. In 1830 the first successful American built locomotives were turned out at the West Point Foundry for the South Carolina Railroad, namely, the Best Friend and the West Point, and in 1831 the same works built the De Witt Clinton, which, as we understand, is the engine which the New York Central Railroad will reproduce and send to Chicago with a train of cars.



## Transporting a Great Gun for the World's Fair.

One of the Krupp exhibits for the World's Fair is, as is well known, a gun weighing 120.5 gross tons. This gun was recently unloaded from the steamer at Sparrow's Point, the great hydraulic shears there being first used for handling it. The shears had been tested before with 149 tons. We show engravings from photographs

will safely pass. The following table gives the principal weights of car and load:

Weight of long bridge.....	47,000 lbs.
" " short bridges each.....	14,400 "
" " 8-wheel car.....	24,800 "
Total weight of car.....	175,000 "
Weight of gun.....	120,000 "
Weight of car loaded.....	295,000 "
" per ft. of wheel base.....	5,545 "

For the following description of the shears and for

It is very evident that as the front legs of the shears approach the perpendicular, and then pass beyond it toward the rear, there is a tendency to fall in the direction of the rams. The weight of the three legs, due to their inclined position, is carried by two chains placed one on each side of the curved track upon which the lower end of the back leg runs. The chain is secured to the front, or nose, of the curved track, then passed around a pulley on the end of the back leg, then back to a pulley placed about midway of the side of the track, then down and around a pulley placed in the ram house, then up over guide pulleys to a counterweight. This arrangement has been found to work most satisfactorily, and has served its purpose admirably. The rear leg is brought in by means of steel ropes operated by a hydraulic ram and passing around sheaves in its lower end.

## Continuous Car Heating in Winter.

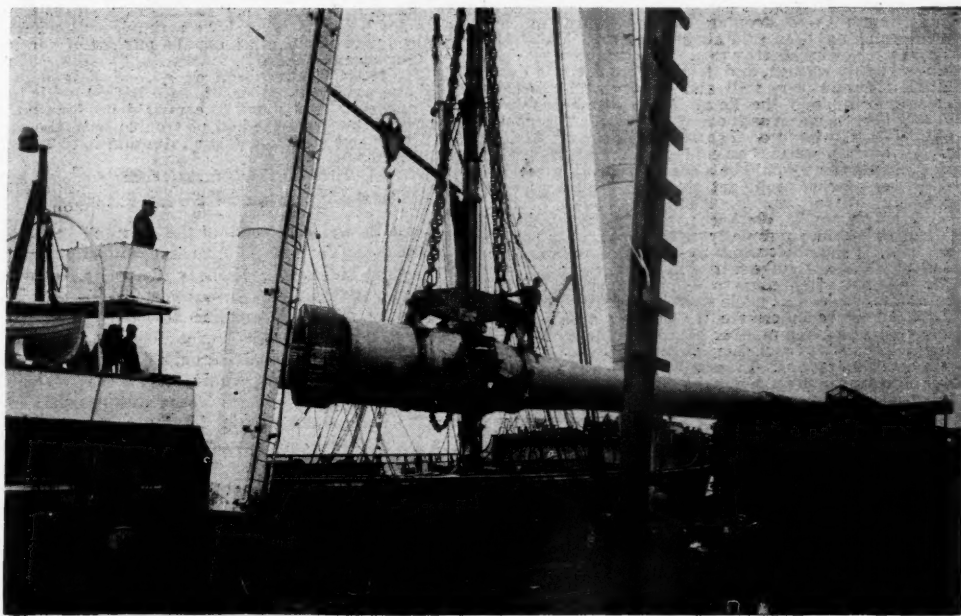
DISCUSSION AT NEW ENGLAND RAILROAD CLUB, APRIL 12.

MR. ADAMS: I presume that each road considers the system it has adopted the best. On the Boston & Albany we think ours is the best, and are well satisfied with it. We have had very little trouble with it, nothing like the trouble we formerly had with the Baker heaters. It may be a little more expensive, but the managers of the road could not be induced to go back to the old system of heating, and it would be very unsatisfactory to the public. We have very rarely had any frozen pipes, not half a dozen during the whole winter, but when we used the Baker heater we had half a dozen cars in the shop all the time. Now we seldom have a car at the shop on that account, and when we do it is through the carelessness of the men nineteen times out of twenty. We were among the first that used steam heat in New England. We have continued practically the same system we commenced with and have found it entirely satisfactory with perhaps one exception, a want of uniformity in the temperature, and I think the time will come when the thermostat will come into general use for the regulation of the heat automatically. The irregularities of temperature are largely due to the carelessness of the trainmen. I think most of our cars have been comfortably warmed and not overheated.

THE CHAIRMAN: Do you run any cars equipped with other systems? Do those cars freeze?

MR. ADAMS: We have had some such cars, and some of them froze up; they did not heat as well, and it required a longer time to warm them. Replying to a question, Mr. Adams said he preferred direct steam to hot water. The only question is to regulate the steam so as to have just enough and not too much.

MR. J. N. LAUDER: The Old Colony went through the past winter with comparatively little trouble with the steam heating arrangements. One of the first considerations in using steam heat is to get the cars ready before they start to run. If you start out with a car frozen up, it is folly to expect it to thaw out during the trip. If you go out with a cold car it takes a good while to get it into a comfortable condition. If you start with a temperature of about 70 degrees it is easy to maintain it throughout the trip if you can educate your trainmen up to the business; and this education is to be accomplished by continual and persevering efforts with the men; conductors should be held responsible for the regulation of the heat, as much as for the performance of other duties, by the trainmen. I don't know why superintendents should not hold conductors responsible for proper heating of trains as much as for guarding the rear of the train in case of detention. I think that will come about by and by. A uniform system is important. If a train is made up with three or four systems, the men will not keep the temperature right in all of the cars. Our difficulty was chiefly with cars from other roads, we had our shops full at one time with cars frozen solid; and pipes burst; against one Pullman car we had a bill of \$113 for thawing out and repairing the heating pipes. If these cars had been heated by plain steam, instead of a mongrel hot water system, there would have been little trouble. Some of us have got to provide better means at terminal points for keeping the cars warm so as to start them out in better condition;



Unloading the Krupp Gun at Sparrow's Point.



Krupp Gun Loaded on the Car.

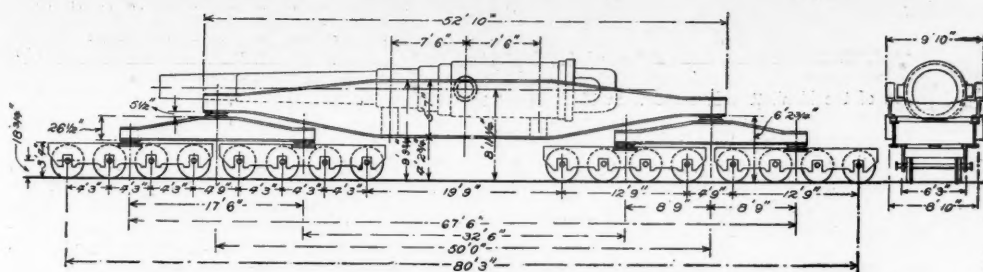


Diagram of Krupp Gun Car Built by the Pennsylvania Railroad Company.

Weight of Gun, 270,000 lbs.; Weight of Car, 175,000 lbs.

taken during the unloading of the gun and after the gun was loaded on the car ready for transportation. We show also a diagram which gives the car in outline and its dimensions. For the photographs and diagram we are indebted to Mr. T. N. Ely, Chief of the Motive Power of the Pennsylvania Railroad.

The gun was transported over the lines of the Pennsylvania and the car was built at Altoona. It has a capacity of 285,000 lbs. and is built entirely of boiler steel; the centre plates and centre bearings being steel castings. It consists of a major bridge, two minor bridges and four 8-wheel cars. The gun rests in the major bridge on two supports, designed to closely fit its perimeter. In addition to these two supports, to avoid any vibration while in transport, the muzzle is secured by wedge-shaped oak blocks, set in cast iron shoes, and drawn up to the muzzle by means of right and left hand screws. The major bridge is 50 ft. from centre to centre of supports, and rests directly on the side bearings, while, on the other hand, the minor bridges are supported by their respective centre plates.

The cars have been designed so as to combine strength with flexibility and are equipped with Janney couplers and draft rigging specially constructed for strength. The journals are  $4\frac{1}{2}$  in.  $\times$  9 in.;  $37\frac{1}{2}$ -in. wheels with wrought iron centres and steel tires are used. Each car has a 14-in. Westinghouse air brake cylinder, with brake on all wheels, and National hollow brakebeams with Christie brakeheads and shoes.

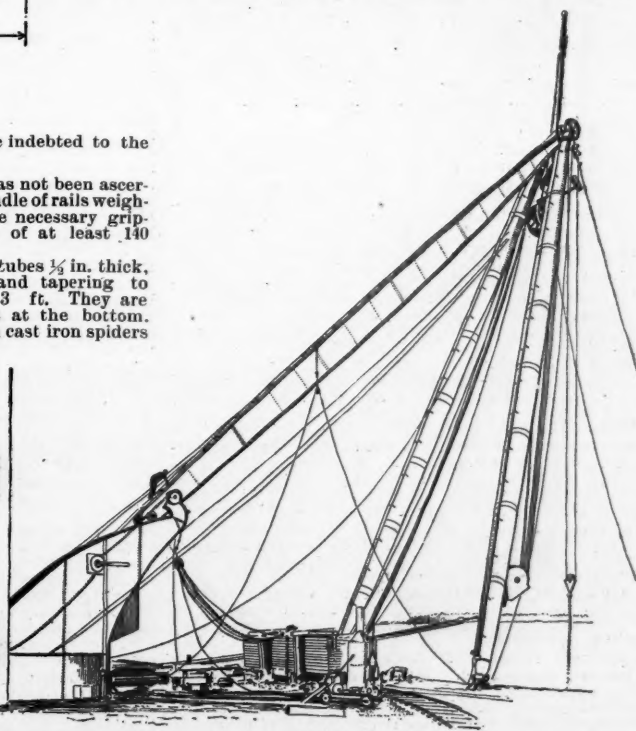
The load on the cars is thoroughly equalized by 32 elliptical springs of 36 in. span, each spring having 18 leaves,  $3\frac{1}{2}$  in. wide and  $\frac{1}{2}$  in. thick. The extreme length of the car is 90 ft.  $\times$  9 in.; extreme width 9 ft.  $\times$  10 in.; extreme height to top of bridge 9 ft. 9  $\frac{1}{4}$  in. Eighteen degrees is the minimum curve around which the car

the pen drawing showing them we are indebted to the Iron Age.

The exact capacity of the shears has not been ascertained. They were tested by lifting a bundle of rails weighing 130 tons, which, together with the necessary gripping appliances, made a total load of at least 140 tons.

The front legs consist of hollow steel tubes  $\frac{1}{2}$  in. thick, having a diameter at the centre of 4 ft. and tapering to each end, where the diameter is 3 ft. They are 116 ft. long and are spaced 45 ft. apart at the bottom. Their lower ends rest in cups formed in cast iron spiders placed on the edge of the dock. When the legs are moved to their extreme outward position, as indicated in the cut, the block is over the centre of a large vessel moored alongside. Extending parallel with the edge of the pier, and just back of the front legs, is a standard gauge track.

The back leg is a latticed girder. The upper end joins the two front legs, while the lower end is provided with rollers adapted to move on a curved base. The shears are provided with two separate and independent hoisting devices. A snatch block is operated by a 1-in. steel rope which leads from the top of the shears down to the house containing the hydraulic rams, where it passes over suitably arranged sheaves, where it is operated by a ram having a diameter of 18  $\frac{1}{2}$  in. and a stroke of 14 ft. The main block is operated by four hydraulic rams having a diameter of 18  $\frac{1}{2}$  in. and a stroke of 16 ft. 3 in. These four rams are arranged in pairs, two on each side of the bottom of the back leg. From each pair pass two steel ropes to the top of the shears, then down to the main block and then over sheaves placed centrally in the top of the shears. A pressure of 1,700 lbs. to the square inch has been found sufficient to lift the heaviest load yet attempted.



Hydraulic Shears of the Maryland Steel Company at Sparrow's Point.

we have to keep cars warm over night at 41 different places. The Boston & Maine road has 52 such places. We have got to have a uniform coupler. Some pet theories will have to be abandoned, but we shall come to a uniform steam coupler; what it will be the future will determine.

MR. MARDEN: Steam heating on the Fitchburg road



during the past winter has been a success. We are using the Consolidated Car Heating Co.'s direct steam method. I don't think it has cost us as much during the winter for extra help to take care of the steam heating plant as it did when we had stoves in the cars. I think our extra help on account of steam heat in the cars was six men all over the line. I don't remember a single instance where a Fitchburg car froze up. One combination car where there was a drip under the car froze up; as soon as steam was applied to it, it was immediately found out. I don't think there has been a single complaint from passengers to our officers in regard to the heating of the cars. The tendency has been to overheat them, and that is due to a lack of attention on the part of the trainmen. We have tried the thermostat in one or two cars with success. We have set it at a higher degree of temperature than we really need in order to have the car comfortable on extremely cold days, to allow for the opening and shutting of the doors. It is difficult to meet the requirements of all the passengers, some keeping their wraps and overcoats on in the car, others taking them off; the latter will be comfortable with a temperature of 70 deg. I am a firm believer in direct steam rather than hot water for heating passenger cars. We have had quite a number of hot water systems on foreign cars frozen up. I don't think it would be economical to establish steam plants at the terminals of our branches [as would be required with hot water systems]. I think with our present system a train of four or five cars can be comfortably heated in 15 or 20 minutes. I don't know whether Mr. Lauder meant that cars should be kept warm all night, but I believe it better that cars should be cooled off during the night and heated up when needed; I think the ventilation would be better; there is an unpleasant smell about a car kept hot day and night.

Mr. SNOW: Perhaps it is a good plan to keep the cars heated during the night. I have noticed on the Erie road, before the cars are attached to the engine in the morning the doors are kept locked until three or four minutes before the time for passengers to get in, for the purpose of warming them.

Mr. TYLER: Last winter I left Boston on a train for a run of nearly 200 miles, in a Pullman car, near the front of the train. It was a pretty cold day, and the passen-

Mr. MARDEN: Of the eight different systems which gives you the best results?

Mr. GRIEVES: I have not been able to decide. We have been very much pleased with the water circulation on the cars where we use it, but we have not been able to determine which system we would prefer to settle down upon as a standard. The pressure at the locomotive, when using the steam heat, has run from 20 lbs. as a minimum to 30 as a maximum, but in some cases it has run up to 50 in heating the Pullman cars. Often we can heat cars with 15 and 20. We do not like to carry less than 15 as a minimum.

Mr. ADAMS: As to keeping the cars warm in the night nothing has been said about cleaning. We wash our cars after every lengthy trip. Every day we get our cars thoroughly washed, and if they were left cold they would not dry out very well and in very cold weather ice would form upon the floor. A car can be as well ventilated if it is warm as it can if it is cold. Warm air is not necessarily impure. I should think the car would ventilate quicker warm than cold. If the temperature is colder outside there would be a change from that cause. I hardly see how we could get along if we did not keep our cars warm continually. As to the expense, I don't think it makes much difference; we think we can keep our houses warm continually without burning much more coal. I shouldn't want to let my furnace fire go out every night and make it new in the morning.

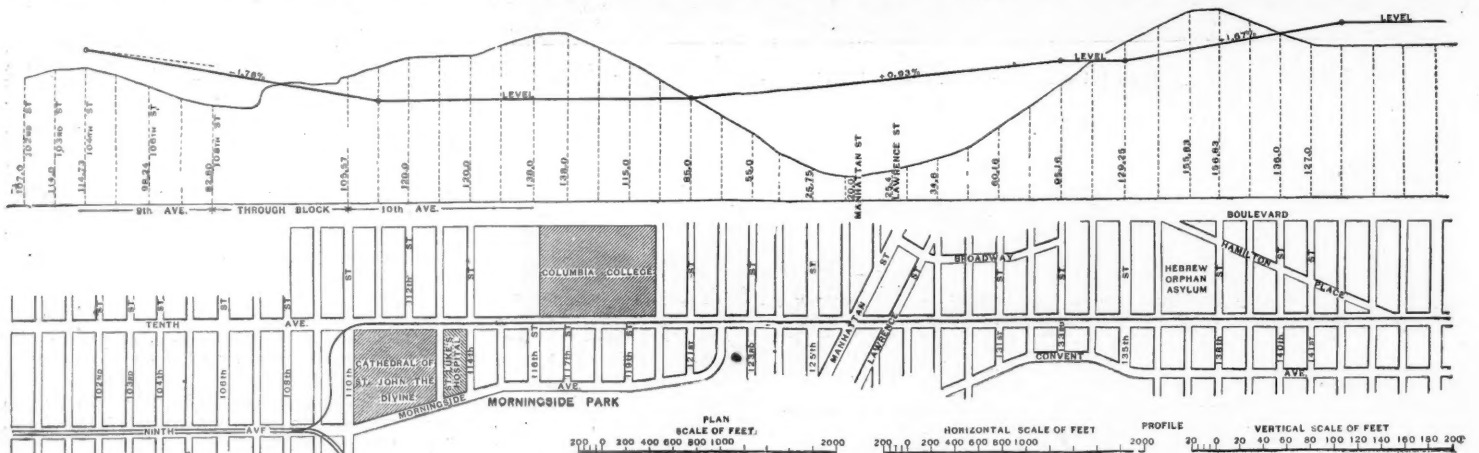
Mr. LAUDER [replying to a question]: Professor Lanza, three years ago, made some exhaustive tests on the Old Colony to determine the amount of steam required to heat a given number of cars. The result of his experiments was surprising to railroad men who had steam heating systems. I remember of hearing at one of our club meetings some years ago one of our leading steam heating men say that a train of eight cars, after they were heated up, could be kept warm with steam passing through an orifice no larger than a knitting needle. Of course that amount of steam would not draw very much from the locomotive boiler. On the engines we had equipped for steam heating, we put a half-inch pipe into the boiler, supposing that would be ample; but Professor Lanza found that it was not big enough, and our experience during the last winter showed that a pipe of that size would not give steam

Mr. DIXON: The Erie road made some experiments with 40-lb. pressure (direct steam) and found there was no steam behind the eighth car, and for 12 cars they required a pressure of 60 lbs. It seems reasonable to allow 5 lbs. pressure for each car in the train; the pipe in this case was not large enough to use less. As to the amount of steam required for hot water circulation, we are heating cars where the pressure for the heaters is less than atmospheric, and doing it satisfactorily, because if the water is heated to 190 deg. it will circulate. I think that on suburban trains with short runs direct steam is the best thing; and the best way to regulate the temperature is to have a simple arrangement whereby a part of the pipes can be put out of service when they are not needed.

Mr. HUNTER: I have been on a road this winter which had a large number of cars heated with hot water, and they had about 60 cars laid up for two or three weeks, but we have had no trouble with the cars heated by direct steam, and our intention is to substitute it for hot water in the other cars.

#### A Mistake in Elevated Railroad Extension.

The plan for the extension of the elevated railroads which the New York Rapid Transit Commissioners offered to the Manhattan Railway Company, involves what seems to us one very serious mistake. It proposes to leave the Ninth avenue line at 108th street, pass east to the Boulevard and thence along the Boulevard to Hamilton place, and through Hamilton place to Tenth avenue. This would carry the elevated through some of the most beautiful property in the city, and immediately in front of the magnificent site recently purchased for Columbia College and in front of the very valuable property of the Hebrew Orphan Asylum. Naturally, the proposed line is regarded by many people as an injury which might almost be called a desecration, and it will be opposed, we have no doubt, by very powerful interests, as it



Mr. Parsons' Suggestion for an Extension of the Manhattan Elevated from 108th Street to 145th Street, New York.

gers began to complain of the coldness of the car. When we got to a considerable grade on the road we were very much frozen, and the passengers bundled up as well as they could. I said to the trainman, "This car is infernally cold." He said: "The engineer has shut off steam in going over this grade; he does it every day; I don't know what I can do." I said, "Can't you do anything with the engineer?" He said: "No; we don't stop for about 20 miles, and it will have to be shut off." We went about 150 miles before the car got comfortably warm; we had then got into a level country. I don't mean to say the engineer had not been instructed to give the cars all the steam they needed; but if he had he neglected his duty.

Mr. MARDEN: That trouble was probably due to the water circulation. With water circulation it is more difficult to keep it warm. If the car had been properly heated before starting and it had had direct steam, you would not have had that trouble, and cases of this kind should not condemn steam heating.

Mr. ROGERS: I don't think it so healthful to keep the cars heated at night to have them warm the next day; I think they should be cooled off at night and ventilated. I have been experimenting with steam heat, and perhaps in an original way. I bought a small thermometer, and have traveled 4,000 miles with it on 15 different roads, and have kept a record of the heat in different cars. Between here and Providence in the smoker it was 55 to 53 deg.; on the Delaware & Hudson in the smoker, 55 to 60; in the ladies' cars, 68 to 72; on some other lines it was 80 to 85; the average has never come below 70. The Wagner cars are not quite so bad as the Pullmans, by 10 to 15 deg. We need to have the heat regulated automatically, and not depend upon conductors, engineers and brakemen.

The CHAIRMAN: It gives me great pleasure to introduce to you Mr. Grievs, of the Master Car Builders' Association, and I hope he will give us his views on steam-heating.

Mr. GRIEVES (Baltimore & Ohio): It gives me great pleasure to be here, and I feel at home with you, as I always do with mechanical men. In the matter of steam heating, on the Baltimore & Ohio road during the last winter I have had reasonable results. We run nearly 1,000 miles with the same train and everything must be in the best possible shape. We had some trouble on account of different systems of steam heating, of which we have eight on our road. With our regular equipment, such as we have on the Blue Line, we get along nicely. At Washington at the Blue Line terminal, on account of those cars having a water circulation, it is necessary for us to keep them under steam heat during the night. If we used a Baker heater for that purpose, it would have to be fired all the time. We have three different systems of direct steam of our own. We meet with great differences of temperature during our runs, and it has been a problem how to accommodate ourselves to them, and taking everything into consideration I think we have got along very well during this winter. We have had some pipe freezing, but I attribute that to neglect.

enough to warm six or eight cars properly on a cold day with ordinary pressure, and in some cases we had to force the pressure up to 60 lbs. to keep the cars comfortably warm. We are now equipping all our engines with a  $\frac{3}{4}$  in. pipe; that seems to give us steam enough to heat an ordinary train. Of course a pipe of that size will take away a large amount of steam from the locomotive. As to the cost of fuel, we found that the cost of heating by steam on the Providence Division for two winters was more than the cost of heating by Baker and Johnson heaters on other divisions per mile, by the records which we kept. The cost is high in New England, about 11 cents on our road per locomotive-mile the year round, when individual heaters are used, owing to the high cost of fuel here. On the Boston & Providence road when we began to heat the cars with steam from the locomotive, the cost of fuel per mile advanced, reached the maximum in January and February, then, having advanced about two cents per mile, dropped off in March and became normal in April and continued so until November. I think there is no question that heating by steam from the locomotive is more expensive than other methods. To keep our cars warm at terminals requires steam pipes in the ground, an expensive plant and extra men. As to keeping the cars warm over night, if they are to remain still for 12 hours, perhaps it would be better to let them cool off; but if you have a hot water system, it is liable to freeze up; if steam is used for heating, you can leave the car to cool, for there is nothing to freeze. If the cars have but a few hours to stand, it is better to keep them warm, and when they are washed they dry more readily.

Prof. ALLEN: It seems to me that a record of the temperature of the train kept during the run would tend to the better regulation of the temperature in the cars. The only expense would be in digesting the records after they came to the office.

Mr. F. H. EDDY: We have not had one car of our own frozen up the last winter, but some of the Pullmans and Wagners have frozen. We have tried traps and thermostatic regulators, which do pretty well, but as a usual thing our trainmen take pretty good care of the train.

Mr. LAUDER [replying to a question]: We set our reducing valves at 40 pounds. It is simply 40 pounds in the pipe outside the car; it is not necessary for the operator to let more into the car than he sees fit. We equipped two trains with the automatic heat regulator, and found that on local trains with short runs it was not good for anything, but on long runs I think it is an excellent thing. An objection to it is that you cannot heat a cold car up quickly with it. You can't let the steam in full drive; you have got to let the regulator take care of it, and that takes time.

Mr. MARTIN: I find that some Southern roads are keeping a record of the temperature. They require the conductor to report every trip, and if it runs over 70 at any time it is regarded as a cause for removal. Many roads prefer straight steam heat to hot water circulation, because they can sidetrack cars without danger of freezing; but in the far West, with very long runs, they want some auxiliary heater besides straight steam.

should be, for it is quite unnecessary. For some time Mr. John H. Starin, of the Commission, tried to agree with his associates on a west side route that would not occupy the Boulevard. It was conceded by all of them that any extension should furnish facilities to the territory lying north of 110th street and west of Morningside Park, which is now wholly unprovided for, the Manhattan railroad going to the east at 110th street.

The configuration of this ground is peculiar. The high ridge which runs along the west side of the city is intersected by Manhattan Valley at 125th street. On the south side of the valley lies what is known as Morningside Heights, formed by the ground rising from 110th street and by the abrupt cliffs of Morningside and Riverside parks on the east and west respectively. The summit of this hill, an area of one-half mile long by 2,000 ft. wide, between 110th and 120th streets, has been taken by the authorities of the new Cathedral of St. John the Divine, of Columbia College and of St. Luke's Hospital, for the erection of costly buildings, which, when completed, will make this hill-top with its natural advantages one of the most beautiful spots in any city in the world. It is, of course, evident that an elevated railroad would seriously mar the architectural effect.

In order to avoid the Boulevard and to preserve the beauty of Morningside Heights, Mr. Starin through his engineer, Mr. William Barclay Parsons, on April 13th submitted a plan, the map and profile of which are presented herewith. The proposed line diverged from the elevated structure between 108th and 109th streets and Ninth avenue, passed through the tier of lots on the north side of 109th street between Ninth and Tenth avenues on a descending gradient. The surface of the ground rising rapidly from Ninth to Tenth avenues, it was found practicable, when reaching the latter point, to pass beneath the avenue. The line then turned north in a tunnel under Tenth avenue to 123rd street and then crossed the Manhattan Valley on a short viaduct, whose extreme height would be 73 ft., and then again went into tunnel through the hill on the north side of the valley from 135th to 140th streets, after which the profile shows an ordinary elevated railroad.

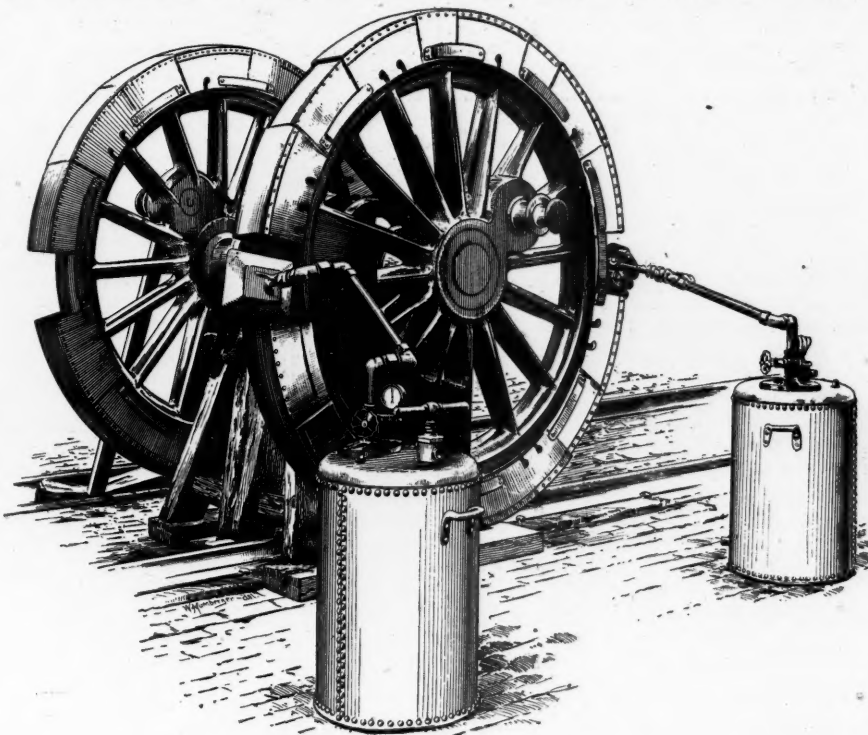
The advantages of this plan are so manifest that it is a source of deep regret that the Commission did not adopt it. It would have preserved the aesthetic features of Morningside Heights; would have left open the Boulevard for the construction of an underground road,



which all the Commissioners have expressed their desire to further; while to the railroad company it presented a line 1,050 ft. shorter than the line adopted, and saved two curves with 46 deg. of curvature, since the adopted line goes across the Boulevard and then comes back to Tenth avenue. Mr. Parsons' line also has a much shorter viaduct over Manhattan Valley and easier gradients. The great institution mentioned above would have given their consents to the construction and would not have been in the opposition as they now will be, and resolutely, we hope and believe. Although the driving of the two tunnels would be more expensive than the

a high degree of heat is uniformly applied, and the tire is heated quickly and evenly without giving the wheel centre itself much opportunity to become hot and to expand with the tire; hence, the whole trouble of sticking, so frequently experienced, is avoided.

The rapidity with which tires can be expanded and removed from or shrunk on wheel centres by this application of Wells lights was strikingly illustrated by some work done a short time ago at the Kingsland, N. J., shops of the Delaware, Lackawanna & Western Railroad. Four tires, averaging 1 3/4 in. in thickness, were removed from 57 1/2-in. centres, and two new tires, 3 in.



The Wells Light Applied to Tire Heating.

same amount of elevated structure, nevertheless, the saving in distance, the lower viaduct and the less opposition from property owners, and consequently less abutment damages, would have gone a long way toward offsetting the extra expense, and the company would have had a better line for operating.

The city authorities opposed the construction of this line on the ground that the old Croton aqueduct is in Tenth avenue. This, however, could have been cut and moved to one side without detriment to the city, in the same manner as the same aqueduct was recently cut and the position changed by the Aqueduct Commission at 135th street. The advantages of this plan are so many and so great that it is hoped that the Rapid Transit Commission will still see their way to adopt it.

#### The Wells Light for Expanding Wheel Tires.

The Wells Light, put on the market by William Halpin, successor to Keegan & Halpin, 46 Washington street, New York City, has become sufficiently familiar to make any specific account of its operations unnecessary at this time. A new and interesting application of the light has, however, recently been made in expanding locomotive driver tires, and the results of the work done with it in this line appear to have been of a very satisfactory character.

The Wells flame, as is well known, is practically a large blowpipe flame, giving a very high and yet perfectly controllable temperature, and to this fact its successful employment as a means of expanding wheel tires is, in the main, due. Just how it has been applied to this purpose is clearly shown in the accompanying illustration, which shows a tire being expanded for removal.

Two lights, it will be noted, are employed, one for heating the upper half and the other for heating the lower half of the tire. The burners are substantially the same as those used for illuminating purposes, but the tubes on which they are placed and through which the oil is fed are fitted with universal joints so that the burners can easily be made to assume any desired position.

Surrounding the upper and lower halves of the tire are sheet metal hoods, made up of several sections or segments linked together, and adjustable so as to admit of making the hoods longer or shorter, and, consequently, of applying them to wheels of varying diameters. These hoods fit over the tire, but leave spaces of the full width of the tire, and about 5 in. high between its face and the top of each hood. Into these flues the flames are directed, being introduced at the gaps left between the upper and lower hoods. The burners, as will be understood, are so placed that one flame is turned over the upper half of the tire, and the other over the lower half, the result being that practically the whole tire face is encircled by the flames. The immediately apparent advantage of this arrangement is that

thick, were shrunk on 44-in. centres. The four first mentioned tires, it is stated, were removed in 50 minutes from the time of the application of the first flame to the first tire. In shrinking the two 3-in. tires on the smaller 44-in. centres it required 10 minutes to heat each tire, and in 13 minutes from the time of the application of the first lamp each tire was in position. Records were also kept of the quantity of oil used in doing this work, showing that two men can remove or adjust, on an average, four tires an hour with an expenditure for material of only 40 cents.

Added to this advantage of rapidity and cheapness should be the fact that the work is independent of the weather; it can be done in the shops as well as out of doors, neither smoke nor ashes being produced. The hoods used in the work are said to have been unaffected by the flame, and would thus appear to promise good service for a long time.

Not content with this one special application of the light the makers point out that it can also be used for other purposes not much less important, for heating engine frames, for example, which have become bent and for straightening them while in position, and for doing other heavy work to which it is impossible or inexpedient to bring a furnace fire. Applied to bent engine frames the flames, it is claimed, will give all the heat necessary for straightening without burning the paint off or heating adjacent parts, and, in addition, will effect an appreciable saving in time. Then again the light may be successfully applied to boiler shop work in laying up laps and corners around water legs and openings, and in boiler repairs for shaping patches, heating bagged crown sheets, etc.

We understand that this apparatus has also been tried lately at the Meadows shops of the Pennsylvania Railroad.

#### Sample Rail Joints.

Mr. R. G. Ward, Roadmaster South Carolina Railroad, Charleston, S. C., has been appointed Chairman of the Committee on Track Joints of the Roadmasters' Association of America. He has addressed the following letter to makers of rail joints:

Writing as chairman of a committee of the Roadmasters' Association upon track joints, of which Messrs. J. M. Meade, Topeka, Kan., Roadmaster of the A. T. & S. F. Railroad; Jno. W. Wright, Baraboo, Wis., Roadmaster of the C. M. & St. P. Railroad; Jesse Supplee, Erie,

Pa., Roadmaster of the Pennsylvania Railroad, and R. P. Collins, Readville, Mass., Roadmaster of the Old Colony Railroad, are members, I beg to request that you will forward one complete joint of any pattern which you may have to each of these gentlemen (express prepaid), for their investigation and report, and also a communication stating the names of the roads upon which your joints may be in use, the number of joints in use on those various roads, and the length of time in which they have been in use. This to enable this committee to give the matter of track joints a most thorough, conservative and just investigation.

It is our desire to have this report made on or before the first of July next, so that it may be consolidated in time to be printed for submission to the Association at its convention in Chicago early in September. Please comply with this request promptly, in order that you may do yourselves justice, which action on your part will be greatly appreciated by the members of the committee and the Association at large; as it is our most earnest desire to investigate fully and conservatively this very important subject in connection with the construction and maintenance of track.

#### Riehle Improved Oil Testing Machine.

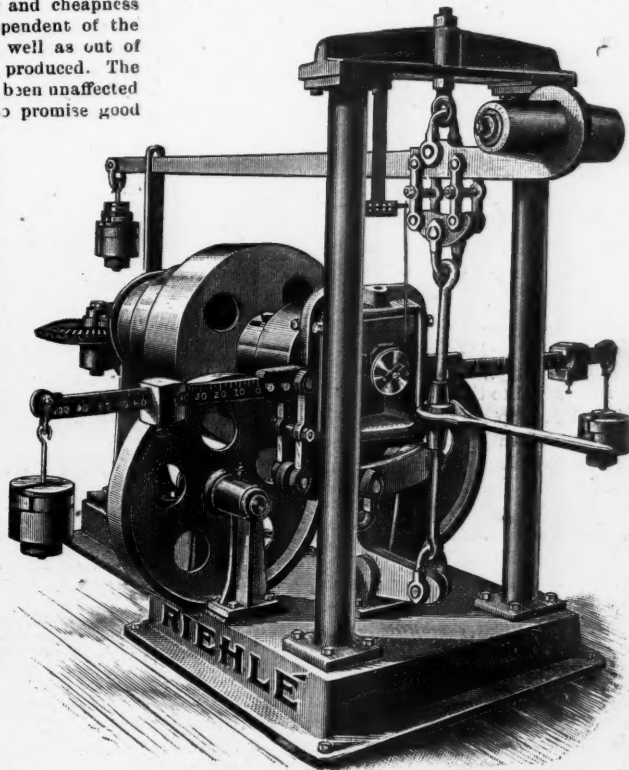
The oil testing machine which we illustrate is designed and built by the Riehle Bros. Testing Machine Company of Philadelphia, particularly for railroad use. It is designed to stand a maximum load of 20,000 lbs. on a regular car brass and axle journal at speeds running up to 50 miles an hour. The yoke which embraces the journal and carries the balanced beam is large enough to take in an entire car journal box, or it can be used with a block piece to hold a brass. The load is applied by means of the lever projecting in front, which raises the weights at the end of the multiplying lever shown suspended from the main column and cross-head. The front bearing of the main spindle is about 12 inches in diameter, and, instead of running in a bearing, rests in the angle of the periphery of two 24-in. wheels, thus avoiding the heat due to sliding friction and distributing it to the large rolling wheels. The frictional pressure of the bearing itself is measured on one of the balanced beams projecting from the yoke these being arranged so that the machine can be run in either direction, merely changing the beam on which the friction is weighed. The number of revolutions is taken on a revolution counter, and the temperature by a thermometer inserted through the yoke casting, while an end movement of about 1/2 in. is given to the journal by means of bevel gearing and a crankpin connection at the back end of the shaft. The cone pulleys are arranged for 8-in. belt, so that liberal power may be developed for severe pressures.

#### The Baltimore-Washington Electric Railroad.

The talk about an electric railroad between Baltimore and Washington is again revived, and perhaps there is something in it. It is understood that Messrs. Browne & Company, Bankers, of Baltimore, are promoting the scheme, and that they are now seeking franchises and right of way.

#### Gas Engines for Street Cars.

Gas engines for street car propulsion appear to be regarded just now with a good deal of favor in Switzer-



Riehle Improved Oil Testing Machine.

land. One of the lines which it is proposed to operate on this system runs from Neuenburg to St. Blaise, and several others, to radiate from St. Gallen, are under consideration. The estimated cost of the several projects is placed at over a million francs, the combined length of the lines being 10 1/2 kilometres, or about 6 1/2 miles.





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#### EDITORIAL ANNOUNCEMENTS

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The decision of Judge Speer at Macon, Ga., proves not to have been so sweeping in its character as the press dispatches indicated. In substance, it promised the Brotherhood of Engineers that they should be treated by the Receiver of the Central of Georgia as well as they had been treated before, as far as the technicalities of a contract were concerned; but the "contract," like most other documents of the kind, is only a schedule of rates and regulations, and the judge expressly states that it will apply to other engineers not in the Brotherhood. The judge recognized the existence of the Brotherhood, and very properly; no sensible person denies the right of organization and of appointing proper committees to negotiate; but he did not order the Receiver to adopt any innovations in management. He says, however, that individuals may appeal from the Receiver to the court in cases, for instance, where promotions are not satisfactory. This is somewhat novel; most judges are content to let the Receiver be supreme in matters of discipline. Further orders were to be issued in the matter, and the general tenor of the judge's utterance indicates that he will probably adhere to business principles in whatever actual orders he issues to the Receiver; though, like some other men on the bench, he probably does not object to a little "gush" in the press dispatches.

#### A Code of Ethics for Civil Engineers.

We began the publication last week and conclude it this week of certain papers and addresses presented at the March meeting of the Boston Society of Civil Engineers, discussing the relations of civil engineers to each other and to the general public. We are glad to have had the opportunity of publishing these opinions of a group of sensible and experienced gentlemen, for discussion of this great question can hardly do harm, and is almost sure to do good. Indeed, we look upon this as the really valuable result of the agitation which was begun last fall for a formal code of ethics for the American Society of Civil Engineers. A correct sense of what a professional man should be, of how he should treat his brothers in the same profession, and how he should stand towards the general public, can only be arrived at as the result of education. Like all other phases of manners and morals it is a matter of evolution and not of revelation or even of exact definition. It is something that grows. A great deal has been written and said about the professional morals of lawyers and of doctors, and less, probably, of clergymen, for the latter are moral *ex-officio*, and the high professional spirit that has been developed among the lawyers and doctors is, of course, very largely the result of just such discussions as that had by the Boston Society of Civil Engineers.

But when it comes to the question of formulating and adopting a code of ethics for the American So-

ciety of Civil Engineers, or for engineers altogether as a profession, the case is not so clear. It is very possible that the American Society will have a chance to vote on this question as a society within a year. Perhaps, it is desirable that it should have that chance; but, meantime, the matter should be very carefully considered, for it is one in which those who have discussed it already in public have taken too much for granted. For example, in Mr. FitzGerald's address, published last week, he assumes that the professions of law, medicine and theology far outrank that of the engineer in the public mind. This we are inclined to dispute to begin with; but passing that, Mr. FitzGerald then asks if one of the reasons for this difference may not arise from the fact that these professions have certain defined rules of conduct or a code of ethics. Now, we believe it is a matter of fact that in all of the states of the Union there exist medical societies, as there are also national societies, all of which have codes of ethics more or less elaborate. But we have yet to find an association of lawyers which has a code, and we never heard of one for the ministers, nor do the architects, in New York City at least, appear to have one. Here is a point on which it would be well to collect a little evidence and disseminate some information. So far as we can learn, the lawyers work under an unwritten code. It is quite possible that there are state or city bar associations that have formulated codes of ethics, but we have not been able to find any, and the point remains good that such codes have had no influence in building up the profession. Of course the lawyers have a very complete ethical system; but it exists in the form of decisions by courts and associations, of writings by various men, and of tradition.

But even the doctors are not of one mind as to what a code should be, or as to whether they should have any code. Some recent experience of the Medical Society of the State of New York is sufficiently illustrative to be worth reporting here. This society has now a very simple code. It is all contained in probably about 1,000 words. The first section of the code defines the relations of physicians to the public, the second states the rules governing consultations, and the third defines the relations of physicians to each other. It is considered derogatory to the dignity and interest of the profession for physicians to advertise in any way, either directly or by means of interviews and the like. It is also unprofessional for a physician to hold a patent for instruments or medicine, or to prescribe secret remedies, whether the property of himself or of others, or to give certificates of the efficacy of patented remedies or appliances. Physicians are authorized to meet in consultation legally qualified practitioners of medicine. This would include homœopaths and other practitioners with whom the members of some other medical societies and associations are not allowed to consult. Under these rules, consulting physicians are required to be very careful to do nothing that shall injure the respect in which the attending physician is held by the patient or his family. Finally, under the third section, defining the relations of physicians to each other, provision is made for gratuitous attendance on physicians, their wives and their children, for one physician taking the practice of another in case of a temporary absence of the latter; and members of the society are warned against controversies in newspapers or pamphlets, and are cautioned that they should refer differences of opinion and interest to arbitration of other physicians before appealing to a medical society or to the law.

This, it will be seen, is really a simple code; nevertheless there has grown up a very strong feeling among the members of this society in favor of doing away with even this code. At the eighty-seventh annual meeting of the society, held last February, the President said that many of the physicians of the state are convinced that the time has come when it would comport more with the dignity of the profession and would enhance the respect in which it is held by the public, if all specific rules of ethical conduct were done away with and the regulation of such matters left to the judgment of individual practitioners. Among a large number of representative physicians from all parts of the state with whom he had conferred he had found a singular unanimity of feeling on this subject. He was of the opinion that the abolition of the code would tend to heal old differences and bring together all the elements of the profession in the state. Acting upon the recommendation of the President, the meeting passed a resolution dropping from the by-laws of the society the only allusion which they contained to the code of ethics, the outline of which we gave above. That was a brief paragraph saying that the system of medical ethics adopted by the society, Feb. 7, 1882, shall be considered authoritative to govern the

medical profession in the state of New York. In the place of that paragraph was substituted a rule, to the effect that if at any time charges are preferred against a member of the society, these charges shall be referred to a committee, which already exists. Therefore, as we read the report of that meeting, this important body of physicians is to-day without a formal code of ethics. When such a body, after years of experience, deliberately abandons the code, it does not seem to be just the time for engineers to set about adopting one.

This case is really very instructive and should be entitled to great weight. After working for years under a code, and learning the various troubles and complications which may arise, this body of physicians has come to the conclusion that in the present state of general enlightenment and under the safeguards now thrown about entrance into the medical profession by legal enactment, the dignity of the profession and the respect in which it is held by the public would be enhanced by the abolition of the code. It does not seem safe therefore to take it for granted, as Mr. FitzGerald appears to have done, that the observance of a code tends to elevate the profession of medicine; nor is it fair to assume that a profession is a profession because it has a formal code of ethics governing the conduct of its members. As we have said above, we believe that the greater part of the lawyers of the United States do not work under a written code. It may be as well to agree upon a definition of what constitutes a profession and then say whether or not the calling of an engineer fits the definition. Probably we can do no better than to consult the "Century Dictionary." In that work we find the following definition of a profession: "The calling or occupation which one professes to understand and to follow. Specifically, a vocation in which a professed knowledge of some department of science or learning is used by its practical application to affairs of others, either in advising, guiding, or teaching them, or in serving their interests or welfare in the practice of an art founded on it." The writer of the definition expands it as implying attainments in special knowledge as distinguished from mere skill, and practical dealing with affairs, as distinguished from mere study or investigation, and an application of such knowledge to uses for others as a vocation, as distinguished from its pursuit for one's own purposes. In the statutes, professional employment is regarded as not including a private agency like that of a factor or real estate broker, which can be taken up or laid down at pleasure. We should say that the knowledge and practice of engineering fit in very well with this definition of a profession.

But we have said the doctors are not agreed as to whether or not they should have a code, and we again cite an experience of the Medical Society of the State of New York. In 1882 the American Medical Association voted that the Medical Society of the State of New York was not entitled to representation in the National Association because the codes of ethics of the two organizations differed and conflicted. A year or two later the American Medical Association adopted a declaration which practically interpreted its own code to mean the same as the code of the New York State Society, but it did not rescind the vote of disaffiliation of 1882, but on the contrary, at a more recent meeting, it renewed that action and extended it to embrace the New York Society as an organization and also all persons affiliated with it. At the same meeting it appointed a committee to report upon the revision of its own code of ethics; and so the New York Society is left in this dilemma: While its code does not agree verbally with that of the National Society, it is not eligible, as an organization, for membership in the National Society; but the National Society's code is officially interpreted as meaning the same thing as the code of the State Society; but still the State Society cannot modify its own code to agree verbally with that of the National Society and thereby become eligible to membership in the National Society, because next year the code of the National Society may not be what it is now and the State Society may again become ineligible or be obliged to again revise its own code. This, we suggest, is an example of a sort of complication which the various engineering societies would do well to avoid if they can.

In saying all this we do not assume to settle the matter; we merely "offer a few remarks" as a contribution to the discussion and as seekers after light. If anybody can show us that the code notion is growing in other professions, or in fact that it is not declining; if he can show us that the great legal profession, which lives without a code, is a profession because of a code, we shall be surprised, but shall not try to suppress truth or reason.



### High-Speed Electric Traction.

In another column will be found extracts from a paper on high-speed electric traction. One defect in this paper is common to nearly all recent papers on this subject—viz., want of comprehension of the power and capacity of the steam locomotive. This may result from observing the action of the steam locomotives and drawing conclusions without carefully thinking over the real conditions under which steam locomotives operate. Contrary to the tenor of such papers, the ultimate speed of a steam locomotive has not yet been reached. Anyone who doubts this will find conviction by riding on a locomotive with large wheels when pulling one car. The heavy trains necessitate the comparatively small wheels on locomotives. The small wheels at high speed make many revolutions a minute, and this puts the valve gear at a disadvantage; but with a light train such as has been proposed for electrically driven trains, and with large wheels, the limit of steam locomotive speed is higher than anyone would care to travel over present roadbeds.

Surely it is not safe to reason that locomotives under present conditions have reached their limit of speed. Take, for instance, the New York-Washington trains on the Baltimore & Ohio. These trains never reach the maximum speed attainable, as it is not considered safe to run over 80 miles an hour. It is generally understood on this road that the locomotives hauling these trains can run faster than the engineers dare to drive them.

The paper to which we refer speaks of the advantage due to spreading of adhesion weight throughout the train, but it is not clear that this is a desirable or a safe practice for high speed. The writer concludes that absolutely new lines will be required for high-speed electric traction, but this is just as true for high-speed steam traction, and with a level straight line as proposed, it would be found that the steam locomotive would run as fast as any human being would care to travel. What electricity is wanted for is not to increase the speed, but to reduce the troubles and cost of operating with the steam locomotive. It is quite possible that the time will come when all trains will be hauled by motors operated by electricity, but the change from steam to electricity will not be made because the steam locomotive cannot be made to travel fast enough with light loads, and our electrical friends should not forget that their motors, as well as the steam locomotive, lose in tractive power as the speed is increased. What is wanted now to throw light on the subject is a true statement of fact about some definite electric locomotive that is running in competition with a definite steam locomotive. So far, the electricians have succeeded very well in knocking to pieces the straw steam locomotives they have written about, but they have done and written little to give one much confidence in the ability of electricians to build an electric locomotive to haul a trunk line train. We have the utmost confidence in the ultimate success of the new Westinghouse locomotive with two four-wheeled electric motor trucks, the General Electric Company's elevated railroad motor, the motors on the Intramural road at the World's Fair, the electric locomotives on the Liverpool elevated, the locomotives on the London subway, and also in the enormous motors now being built for the Baltimore belt line tunnel; but, except for the London and the Liverpool locomotives, little has been actually done that proves anything, and what has been proved is too little to lead to any conclusions about trunk line work.

### An Official Utterance on Signaling.

All of our readers who are interested in railroad signaling have, doubtless, read the report of the American Railway Association Committee on the subject, which was printed in the last issue of the *Railroad Gazette*. We have urged the preparation of a report of this kind, and the action which has now been taken will be productive of good results. Hundreds of miles of railroad in this country are now rapidly growing into the conditions, as to density of traffic, which have existed on the principal railroads of Great Britain for the last 20 years, and are, therefore, in that state where the signaling problem assumes an importance which, until recently, has been regarded as a peculiarity of English roads. Many who have felt warranted in ignoring the lessons of English experience because of our "different conditions" now find that the lessons must be heeded, whatever source they come from.

Although both the science and the art of signaling are young in this country, there is a good deal of existing practice, scientific or otherwise. A body like the American Railway Association which aims chiefly at systematizing existing practice, rather than at

marking out new lines, has, in this field, a peculiarly difficult task. Moreover, the subject of signals comes within the province of the Superintendent more directly than most of the matters which have in past years been the subject of discussion among the roads of different sections of the country, and progress is therefore subject to the hindrances arising from provincial notions or conceited prejudices to a degree at least as great as in any other department of railroad-ing. We do not know that Superintendents are more provincial or conceited than Master Mechanics, or Engineers of Roadway, or Editors for that matter, but as we have been told by Superintendents themselves that such is the case, we give expression to the idea here for what it is worth.

We shall not discuss this report in any spirit of fault-finding. It is a first report, and the larger part of it is a summary of replies, and we shall not undertake to criticize it. But as most of the matter, both of fact and of opinion, represents but a few roads, further discussion is certain to ensue, and criticism will be sure to arise, for the existence of differences of opinion is apparent from the most hasty reading of the report, so that it will not be out of place to set forth some of the points at which these differences will appear. Of the 51 roads replying to the committee's circular quite a number took occasion to expressly state that they had had no experience with block signals and therefore did not put forth their opinions as of value; and others expressed themselves with considerable caution. Again, important roads like the Pennsylvania and the West Shore, which have used block signals longer than most American roads, are not represented in the report at all. We shall therefore take the liberty to speak freely of the substance of the report, while taking care not to impute to the committee or the Association any responsibility that does not belong to them; and endeavoring to stand in the attitude of inquirers rather than critics.

The first definition, which calls a block section a "block," is peculiar. This is the official term used on the Pennsylvania road, and doubtless represents the American spirit which believes in the shortest words which have sufficient expression in them, and we shall not quarrel with the definition. The third definition, that of a distant signal, will probably need amplification. As it now stands, a rock, a tree, or an old barn would answer for a distant signal. All existing distant signals not only "give warning that another signal must be looked for," but also indicate what position that other signal is likely to be found in. The definition, "telegraph block signal system," seems to be good. Whether this is intended to include not only the Morse and Wheatstone telegraphs, but the ordinary bell code, we do not know, though we see no reason why it should not include the latter. The application of the term "system" to the plant and not to the method of operation is another point on which authorities will disagree. "System" is a much abused word, and we shall not attempt at this time to argue on one side or the other, but it will be well for those who have definite notions on the subject to brush them up for the next meeting.

Perhaps the most noticeable thing about the list of definitions is the absence of the word "home," as applied to signals. In our opinion this is quite an expressive term, and it has become so familiar that those who wish to cast it aside ought to let people know their reasons for so doing. Even if it is to be thrown out of use the next most familiar word, "stop," should be a strong candidate as its successor. We do not believe that railroad officers, in practice, will recognize any material difference between a home or a stop signal at the entrance of a block and a home or stop signal which guards a switch. In the diagram, fig. 11, shown in the *Railroad Gazette* of April 7, the several semaphores, C, D, E and F, are all of the same character, and all give the engineman the same kind of an indication; so that they are uniform, in an important sense, though they have diverse names. This uniformity is highly important from the engineman's side of the question, and anything which gives to a block signal a degree of importance greater or less than that pertaining to stop signals at other danger points is to be at once questioned.

Whatever may be said of the imperfections of this code of definitions, there is one feature of it whose value outweighs a good many defects, and that is the recognition of the true function of a distant signal. One of the most noticeable weaknesses in signal practice on American railroads to-day is the attempt to make distant signals serve also as stop signals, or as giving an indication to stop at some other point than exactly opposite the home signal. This is due to all sorts of crude notions, and anything that will help to kill out these will be a marked gain.

As in the definitions, so in the recommendations

(which, be it remembered, are the recommendations of the replies and not of the committee), the excellences, as matters now stand, outweigh the defects. One of these is the distinction between absolute and permissive blocking. It is to be hoped that in due time we shall have a further definition, showing just what permissive blocking is, for some very good railroad men still labor under much confusion in defining permissive blocking and stating the difference between that and the time interval system.

The fourth recommendation, that a distant signal should be used in connection with the block [home] signal, will be worth its weight in gold to any road that will accept and be governed by it. This definition tells no news; all good signal engineers have recognized the truth for years; but the appearance of this dictum in this place, will, doubtless, serve to strengthen some backbones. The principle can stand on its merits anywhere, and it does not need the authority of an Association, much less the authority of any limited number of members, to prove its worth, but this will give it a chance for a more respectful hearing.

The fifth recommendation is that block signals should be of different form from other fixed signals. This recognizes a very good principle in automatic block signaling, some of the best experts having long held that an automatic signal which gives to an engineman an order which is positive at the moment, but which he may within three minutes afterward disregard, should be different from a stop signal which he must never disregard without special instructions from a signalman or from the Superintendent; but why a semaphore at the entrance of a two-mile block section should be different from a semaphore at the entrance of a 20 ft. block section which covers a railroad crossing, is by no means apparent. It has never been so in practice and there is no reason for it in theory. Even a train order signal may, in the view of many experts, be a semaphore as well as any other form.

When we read the sixth recommendation we wonder whether those who drew it up mean just what they say. This paragraph is apparently intended to show the importance of painting semaphores red instead of allowing them to become smoky or of a "confusion color"; but surely no member of the American Railway Association can think of claiming that the red color on a semaphore always helps to convey the meaning of the signal. On the contrary, if the arm is down the red color conveys a meaning contrary to that of the signal. Further, what is it proposed to do about night signals? Of course we are not ignorant of the fact that there is one semaphore signal which shows red at danger and white at clear, by day and night, with more or less distinctness; but we assume that the committee would not think of limiting practice to one patented device.

The seventh recommendation is of interest in connection with the third under paragraph b. This last recommendation (b 3) will be questioned by those who wish to preserve uniformity in the practice at all semaphore signals; for in yards, where trains follow each other very closely, it is often necessary to restore a signal to danger before the rear of a train has passed it. There is a reason for wishing to postpone this movement at block stations, where the block sections are long; but even here, if permissive blocking is used, it is often desirable that the signalman shall be at liberty to restore his signal at the earliest possible moment.

Recommendation a 8 evidently contemplates a three-position semaphore. The principle here involved is sound, and it is to be hoped that this paragraph of the report will lead to discussion and to improvement in practice; but there are so many signal superintendents who seem unable to get their signal arms pulled down lower than 45 degrees, even for the all-clear position, that the prospect of securing an agreement upon any improvement involving the employment of three positions seems dubious.

The recommendation that the flagging rules should never be relaxed under the block signal system was to be expected, as a matter of course, as that is the universal practice, in the rule-books, in this country; but this does not alter the fact that some few wise and courageous men, of the most extended experience and the highest reputation, believe in making the block system stand on its merits and in "abolishing the flagging absurdity altogether." These men hold to the soundness of the principle that one's entire energies had better be given to the perfection of one means of safety—the space interval—rather than be divided between two. Moreover, as we have repeatedly pointed out, the formulation of reasonable and enforceable flagging rules, for use on a road where trains are very frequent, is a practical impossibility.

The first recommendation under paragraph b (tele-



graph block system) seems to have been called out by the practice on the New York, Pennsylvania & Ohio, where the action of the station operators in handling the block signals is directly supervised by the train dispatchers. We do not know how well pleased the Erie people are with this system, but it is admitted that there is one important objection to it, and that is the expense. The dispatchers' divisions have to be very short. As the Erie does not employ this system throughout its lines, it is not to be assumed that it is regarded as unquestionably superior to all other methods. The third recommendation under this head has been noticed in a preceding paragraph. The fourth simply gives formal recognition to the practice on the Pennsylvania and most other roads. We have heard that the 100-yard limit has, in some cases, been changed to a 300-yard limit. When we reach that millennial time in which every home signal shall have a distant signal, this rule will lose some of the importance which now attaches to it. The fifth recommendation is doubtless designed as a warning to those roads which try to operate a block system without a starting signal, assuming that the regulations are just as safe and secure as though such a signal were used. The committee's definition "block signal" refers to the signal which roads using starting signals call the home signal, but such roads never interlock these two. If the starting signal were beyond a siding it would, in a sense, be used to let trains out of the siding, but even then its interlocking with the home would be an anomalous arrangement, and it is not exactly clear what the recommendation means. Of course the only way to block trains where there are numerous switches between blocks which cannot be controlled is to use the permissive system very freely.

The recommendations for controlled manual and for automatic systems are very brief and will not excite much comment. The rejection of wire-circuit automatic signals probably represents a very general sentiment, and yet the Chicago & Northwestern and the Illinois Central have just put in wire circuit signals, and the New York, New Haven & Hartford has used them with success for 10 years. The Liverpool Overhead road has just put in a wire circuit system that promises well. Recommendation 43 controverts the theory, so long prominent in the use of the clockwork signals, that the engineman should have regular information that the signals are in working order. It will be of interest to know which view formed the basis of this recommendation—that the brakemen can act as monitors to see that signals go to danger, or that the signals can be made to work with such certainty that no monitor is needed.

#### An Accident on a Chicago Cable Road.

Last week Chicago people had an illustration of the dangers of running cable roads in narrow and crowded streets. The downtown loop of the Northside cable road commences at the mouth of the La Salle street tunnel, runs south three blocks to Monroe street, east two blocks to Dearborn street, north four blocks to Randolph street, and west two blocks to the mouth of the tunnel. A cable train consisting of three large passenger cars and one large grip came out of the tunnel, and the gripman attempted to stop just south of Randolph. The grip refused to let go the cable, and the train could not be stopped. This cable runs at about six miles an hour, and in spite of the efforts of the gripman to stop the train it ran all the way around the loop and down into the tunnel at the speed of the cable, causing considerable damage on the trip. Horse cars were overturned and vehicles damaged, and the train was only finally stopped by a collision with the preceding train when part way down the grade into the tunnel. Several persons were injured in the collision. On an examination it was found that one of the strands of the cable had become loosened and had caught in the grip. At the collision the grip was wrenched from the car and passed under the preceding trains and damaged several grips. The result was that the whole loop was blocked until the next morning. As soon as it was discovered that the train could not be stopped, some of the employees of the road ran ahead of the train warning people to get out of the way; and had it not been that the accident occurred when the streets were comparatively free from traffic, the damage would have been much greater.

The seriousness of this accident can hardly be realized until one sees an unmanageable train of four cars running through the streets of a crowded city. Most of the streets of Chicago are very wide, being from 80 to 80 ft. between curb lines, with room for a double-track railroad, with space sufficient for two trains abreast on each side between the tracks and the curb lines. Had there been a blockade in the street with teams going in both directions, the loss of life would have been considerable. The possibility of such accidents is one of the defects of the cable system, and although there have been many attempts to design a grip that will not get tangled up with a loose strand, yet cable men assert that nothing has been

designed that will prevent such accidents with any certainty. If such an accident as this should take place in the vicinity of the World's Fair grounds during the coming summer, the cable railroads on which many people will have to rely for transportation to the World's Fair grounds would be blocked for hours. On the section of the cable road nearest the Fair grounds the cable travels at a speed of 13.8 miles an hour. The increased speed would make an accident of this kind all the more dangerous. One of the advantages of a cable road in crowded streets lies in the fact that the cable has a fixed speed and it is impossible for a car to run faster than the cable; hence there is no danger of racing in the streets, such as is common with the electric railroad in Boston; but the possibility of such an accident as a cable getting entangled in a grip offsets considerably the advantage obtained by a fixed maximum speed.

Chicago people are accustomed to the most dangerous conditions of street transportation existing in the world. This is apparent from the fact that trains of four cars each, moving quite rapidly, pass each other going in opposite directions at intervals of about 15 to 20 seconds, giving just time for teams and foot passengers to dodge the trains. Crossing the cable lines are numerous street car lines in the downtown section, all of which render the heart of the city a place to be avoided by all but active people. The city authorities realize this, and have detailed policemen to watch the crossing points; but it is needless to say that one policeman has but little power over traffic so important and heavy as that just described. Practically, in Chicago, the cable roads have the right of way, and the public feel that they must look out for themselves. In no other city in the world is it customary to run four-car trains in opposite directions through the principal streets; and if it were not for the fact that the cable companies give to their cables the most rigid inspection every night after the cars have stopped running at 12 o'clock, the troubles would be greater than they are. The inspection of the cable is much more thorough than the inspection of the grips; but a broken grip will only cause a delay of an hour or an hour and a half, while a broken or stranded cable may cause a delay of from four to six hours. If such an accident as this one in Chicago should occur on Broadway, New York, where there is little room for teams, the result would be very expensive for the cable company, and would, very likely, cause loss of life.

As stated in our article in this issue on World's Fair transportation, the "Alley" elevated (Chicago) is in a position to handle about 12,000 passengers each way per hour. This is greatly below previous estimates of the carrying capacity of the road, and is not on account of difficulty in handling trains, but is merely a question of equipment. The reasons for neglecting to provide better transportation and to greatly increase the earnings of the road, are not clear. For the building of the first section of this road from Congress to Seventy-first street, \$7,500,000 of bonds were sold. With the proceeds of the sale of these bonds the road was constructed to Sixty-third street. For the building of the second section of the road, including the line on Sixty-third street to Jackson Park, and the proposed lines to Englewood and the stock yards, \$5,000,000 of bonds were sold. This makes the bonded indebtedness of the road \$12,500,000. The interest on this amount at five per cent. per annum will be \$625,000, which constitutes quite a heavy fixed charge. The present year offers exceptional opportunities to this road for earning money. The indications are that there will be a passenger for every seat that can be provided by the company for several hours each day during the summer, and conservative estimates as to the difference of the earning capacity of the present equipment and of the equipment that could be handled is about \$3,000,000. This would pay interest on the bonds for four or five years and permit the payments of a good dividend on the common stock. By the time this is paid out in interest the road would be in a position to earn, in addition to the interest on bonds, a surplus out of which a comfortable dividend on common stock could be paid. As is well known the stock of this company sold at one time at 120, the present selling prices is about 95. It is understood that the road has already paid about \$750,000 in interest on these bonds and this with a line of less than seven miles long. Within four years this length of line will be about doubled and the earning capacity greatly increased. It seems strange that the management of this road should neglect an opportunity which promises such substantial returns and places the common stock in a position to pay dividends without interruption almost from the start.

A contemporary, which has been somewhat exercised recently about some of our remarks on indicator cards and the use of them in locomotive cylinders, is much elated at finding a stationary compound engine that gives a most peculiar indicator card. Whatever the engine is, or where discovered, our contemporary does not say, but it is clearly peculiar as it gives a knee joint expansion line, and while running at 210 revolutions a minute gives as sharp a cut-off point as is obtained from a Corliss valve gear at 90 revolutions. It is concluded that when a locomotive is compounded on this principle "our present designs of compound locomotives will have to improve their records or they will be left behind." Our contemporary fortifies itself, however,

with the reservation "if this is done, and this steam distribution can be obtained in regular service," and it is well to have done so, for the burden of proof of the truthfulness of the indicator card lies with the editor. In praising the indicator card from this mysterious engine (the name of which is not given) our contemporary remarks that "the loss between the high and low pressure cylinders is unusually small." How this has been found out, we do not know; but from the indicator card the drop in pressure between the cylinders is 12 lbs., a quite inexcusable amount for a stationary engine. This does not compare very favorably with the drop between the cylinders on the Dean compound locomotive, which, from recent indicator cards, is shown to be about 3 lbs.

The Massachusetts Legislature has passed one more amendment to the law of 1890 to facilitate the abolition of grade crossings, making it still easier for the towns. The substance of the original law, it will be remembered, is a provision that one-fourth of the expense of all changes of grade (where streets are to be run above or below the railroad) shall be paid by the state. The burden upon the town is generally only one-tenth of the total cost, but even this is often a serious tax, and the present bill provides that the state may pay the town's share and the town repay the loan in graduated annual payments, to be regulated by the auditor of the state. The rate of interest on the loans is to be 4 per cent. The Senate Committee on rapid transit reported a bill last Monday providing for the early erection of a union passenger station on the north side of Boston. This bill is evidently to carry out the recommendations of the Railroad Commissioners' report, which showed that the Boston & Maine had been unreasonably dilatory in this matter. It includes provisions requiring the abolition of grade crossings in the approaches to the station, which means the elevation of the tracks for a considerable distance north of the Charles River. The city is required to pay a part of the expense of a new bridge over the Charles River.

The new maximum rate bill which recently passed the Nebraska Legislature has been signed by the Governor and has become a law, the rates to go into effect next August. The general effect of the bill is stated to be a reduction of about 20 per cent. in freight rates, but this reduction is an average found by comparing the new with the old rates. In some cases rates are advanced and in others they are reduced. It looks as though the framer of the bill took care to protect his own constituents without much regard to the other portions of the state. No action has yet been taken by the railroads as to whether they will put the rates in effect or not, but it is safe to presume that they will all fall into line, as it is not probable that they will be unanimous in any other plan.

#### NEW PUBLICATIONS.

*The Mineral Industry.*—Its Statistics, Technology and Trade in the United States and other Countries, from the Earliest Times to the end of 1892; Volume I. Edited by Richard P. Rothwell, Editor *Engineering and Mining Journal*. New York: Scientific Publishing Company, 1893. Pages xxii. + 628; large octavo. Price, paper, \$2; cloth, \$2.50.

This volume is a result of the development of the annual statistical numbers of the *Engineering and Mining Journal*, of which we have had occasion to speak very favorably before. For some years that journal has collected statistics of the mineral products of the United States and published them promptly at the close of each calendar year, and this publication has been very useful as well for its accuracy as for its remarkable promptness. This work has been compiled, enlarged and collected into the volume now published, in which are given statistics of nearly all of the minerals and metals produced in the United States and in many other countries for the year 1892, and in many cases from early times. It is proposed to follow up this first volume by others covering the entire mineral industry of the world, each volume supplementing the data given in previous issues. Much attention has been given to the subject of cost of production. It has been the effort of the editor to make his statistics as accurate and as complete as possible, and he brings them forward with confidence, but at the same time he earnestly requests his readers to notify him of any errors or omissions in order that corrections may be made in subsequent volumes. The names of 57 special contributors are given, although it is said that it would be impossible to enumerate the names of all who have contributed statistics or other valuable information. We cannot pretend to have examined the volume so closely as to express an opinion, from actual observation, as to its accuracy; for that we must take the names of the editor and his contributors; but the mass of information collected is certainly very great and the volume is a valuable addition to the library of the scholar and is a triumph of enterprise.

*Burdett's Official Intelligence for 1893.* By Henry C. Burdett, Secretary to the Share and Loan Department of the Stock Exchange. London: Spottiswoode & Co. 1893.

This is the twelfth year of this well-known publication, which is intended to be a careful summary of information regarding British, American and foreign securities. It includes government, corporation, colonial and foreign stocks, railroads, canals and docks, telegraphs, tramways and water-works, and, in short, all such commercial



and industrial companies as are known in the London market, and dealt in on the principal exchanges. It has also special chapters on the national debts of the world, county, colonial, Indian and municipal finance, railroads and water-works. The lists of securities are very conveniently arranged, and the typography of the book is beautiful. Under each company are given the names of the directors and certain administrative officers, data as to amount and forms of securities, and a very concise history of the enterprise and of its securities. The work having been edited for so many years by a man of the highest authority, and covering as it does such an immense range of securities, is of particular value for reference.

### The Ethics of Engineering.

We continue from our issue of April 14 (p. 285) the addresses and papers presented at the March meeting of the Boston Society of Civil Engineers on the relations of engineers to each other, to their clients and to the general public.

JOHN W. ELLIS—THE RELATION OF THE ENGINEER TO THE PUBLIC.

The engineer, through his education and his calling, or rather, as I prefer, his profession, is brought in contact with business men and public officers of all kinds and stations. It is from the labor and estimates of the engineer, on his recommendations as to the feasibility and practicability of the enterprise, that the foundation for the most important public improvements is based, and I might truthfully add that the officer to whom he reports really uses the information given to him by the engineer as the real substance of his report, and very often receives the credit and praise as having not only been the originator and promoter of the enterprise, but also the manner in which the work should be done.

I believe that the engineer should assert himself, and that, through the influence of a society like ours, he himself should be able to show the public that he is equally as able to manage and dictate public improvements as he is to make plans and estimates for their conception; that he should identify himself with public matters, becoming a public officer, and in that way coming in contact with public men of all professions and of all kinds of business. In this way, he not only will promote public interests and his individual welfare, but also, if he be true to the profession, will aid his associates and increase the influence and standing of this Society.

In regard to political association, I think it is his duty to associate himself with the party which he believes to be the best for the promotion of the public interests, and to make himself prominent in that party; to become acquainted in that way with public matters, and, whenever there is the necessity for any public improvement requiring a commission to be appointed, to insist that his profession should have a representation. In this connection I refer to an instance in your own state. When an act for the establishment of a Board of Railroad Commissioners was established by the Legislature of Massachusetts, it was understood that it should be composed of a lawyer, a business man and an engineer, but it was not made a part of the act, as it should have been; and I maintain that if engineers had been members, or appeared before a committee of the legislature, they would have insisted that this should be incorporated in the act. The intention of the act, however, was carried out in the first appointments and continued to be so until one of your governors, in making the appointment, decided to dispose of the services of the civil engineer on that commission and fill his place by a locomotive engineer, and since that time there has not been an engineer as a member of the Board of Railroad Commissioners. If the lawyer had been disposed of instead of the engineer, do you think the legal fraternity would have been satisfied to remain silent? It was also intended, when the act for the abolition of grade crossings in your state was established, that the commission would be composed in a similar manner, but this rule is not followed, as last week a judge, in the appointment of a commission for the abolition of these grade crossings in the city of Worcester, appointed three lawyers on this commission. If he had appointed three engineers it would have been much more suitable, for this work is almost wholly of an engineering nature.

How and in what manner can engineers make themselves prominent in public matters? It seems to me there are many ways of doing this. This Society could appoint a committee, whose duty it should be to report what acts are being passed and what new acts are necessary for public convenience and business, for engineers should be originators of methods, and this committee should attend the hearings and show by their presence that engineers are interested in public matters, and demand public recognition; or, our president could be made a committee to attend to these matters, and I believe should be paid for services rendered in this capacity. . . . The engineer should not be satisfied to go to his office in the morning and leave it at night, and continue this routine of duty day after day, month after month and year after year, but he should devote some of his time to public matters, interest himself in all public improvements, and demand that he shall not be at the beck and call of other officers, but a man among men, and the peer of the majority of men.

Let us hope that in the year 1893, which promises so much of interest to the members of this Society, not only at our World's Fair, but here in New England, that a new departure will be inaugurated. Certainly let it be known in the cities and statehouses of New England that the Boston Society of Civil Engineers is in existence, and not only is willing, but proposes to help solve the problems of rapid transit, better roads, of improved terminals, of elimination of grade crossings, of improved sewerage, etc., in fact let its influence and advice be required in all public matters and public improvements.

WM. E. MCCLINTOCK.—THE ENGINEER, THE PUBLIC AND THE PRESS.

The good Book tells us that the same people who spread palm leaves one day cried, "crucify him!" only a few days later. Many an engineer who has held positions of public trust has gone through a like experience. However good he may be or however perfect his work, there is sure to come a time when it is all forgotten and he is removed from office under a cloud, the opposition coming from a few dissatisfied persons while the great public look calmly on, wondering how it is possible for such a good man to go wrong.

As engineers we expect to be criticised by the public, as they decide as to the value of works, solely on the ground of personal benefit. When the engineer is at work on his own business he is a specialist and not one of the people. He must range far ahead of them and be a leader of public opinion. To do this he must be posted on every part of his subject and educate the public up to his standpoint by talking in season and out of season. The educational part should come before the subject comes up for final settlement and then the governing body can vote understandingly on it.

One of the great cries of the day is that raised by the public against the corporations. They are spoken of as the greatest enemy of the public, and any scheme which they propose is taken as another attack on the people to take away the few remaining rights they may have. The engineer should never join in such attacks. He should be the judge rather than the critic. Because the party urging the improvement is a large corporation it does not follow that their only object is to take away the people's rights. Any great public benefit must work injury to a part of the people, and they, perhaps, feel that great injury is done them, but the great majority receive a benefit.

In the investigation of the state highways just made by the Commission it was found that between three and four millions a year are expended in highway improvements. In but very few instances are records kept which show where this money is used, or how. We see such items in the annual report as this, viz.: "Pay-roll \$2,000 or \$6,000. John Jones, supplies, \$1,000." In but few places is any attempt made to obtain an itemized account of the expenditures, and the heads of departments can give no information. I say it is the duty of the engineer to educate the people up to a point where these records shall be kept in spite of those who disapprove. The people should know where this large amount of money is going to, and, by knowing what work costs, judgment may be passed upon it as to whether it costs too much. My attention was brought to this subject to-day when looking over the works of Geo. F. Blake at Cambridge. After we had gone the rounds of the works and returned to the office we were shown the little slips of paper and time clocks on which the mechanic's time was recorded so as to make a record of just how many hours he worked on any one part of any work he was engaged in. A record of this kind makes it possible to know whether money be made or lost on the work without waiting till bankruptcy convinces one that no money is being made. My own experience in this line is a good example. When I took charge of the streets of Chelsea there was no record kept and in my simplicity I attempted to make one. I was told that it was all nonsense, that we had so much money to use and when it was gone we would have to stop. One of the first things I discovered was that it was costing us \$1.75 a day to break stone. On inquiry in other towns I found that it was too much money. On examination of the methods I found an antiquated system which required a large force of men. This was remodeled and the cost of breaking was reduced about 50 cents. This is but one of many illustrations which could be given.

Every time a lawyer does anything it is carefully noted in the papers. I have been repeatedly told during the past year that the Boston Society of Engineers worked so quietly that no one knew of its existence. We come here night after night and talk over business which largely interests the public, and in our modest, simple way we keep it to ourselves. I see no reason why the Boston Society should not be ready and willing at all times to place itself on record either for or against any important public improvement. I do not mean to pass a snap judgment, but to appoint a competent committee and act on their report and then boldly work for it.

ALBERT F. NOYES—RELATIONS OF THE ENGINEER TO HIS ASSISTANTS OR SUBORDINATES.

An assistant or subordinate is a person who may be assisting or be working under the direction of another. So that the consideration of this subject is applicable to all from the lowest to the highest in authority. The assistant or subordinate may be so, as a result of cir-

cumstances, or from a lack of opportunity to fill the position for which he may be fully able, from his experience, training and education to fill with credit, or he may be just beginning his professional career, fresh from school or college, with more or less technical training and little or no experience practically in the work of the profession or calling (by which ever name it may finally be called). In either case it is the duty of the engineer and each assistant, from the highest to the lowest, to his clients and himself, to not only avail himself of the best efforts or services of the men who may be assigned to assist him, but to do all he can to increase their efficiency and ability to assist. . . .

The lesson of helpfulness has been repeatedly taught me by the actions, words and simplicity of manners of such eminent engineers as the late James B. Francis, E. S. Chesborough, Moses Lane. . . . What engineer who has had the pleasure of a personal acquaintance with either of these gentlemen but what can recall the kindly greeting and expression of personal interest he has received. Who, from the highest to the lowest, has ever applied to them professionally for advice or for a statement of the results of their experience upon any problem which they have had to solve, but have found them ever ready to forego personal pleasure or ease to assist. I do not believe the man can be found.

I well recall the expression used and injunction made to me by one of these gentlemen who had incurred considerable personal expense, and who had given me a considerable portion of his time for a day without expectation of compensation in order that I might fully understand the methods used and the results obtained from original work which he had successfully executed and which might assist me in more intelligently executing certain work which I was planning for. I refer to it here in hopes it may impress others as it did me. Upon protesting against his putting himself out to the extent he must have, for he was a busy man, he replied, "I am an older man than you, and this gives me a right to do as I please. What we older engineers know we have learned by hard and busy years of work and study. Now it is not right that we should carry our knowledge to the grave with us, without doing what we can to impart it to others. All I ask of you is that as you grow older and take our place in the profession, you will do what you can to assist the younger engineers with whom you may come in contact."

In order to get the best results from the services of an assistant or subordinate, he should be brought in as close contact as possible with the mind of the engineer. He should be early taught to reason and to constantly put forth his best efforts. No mind, however mature, can grasp at once all of the conditions affecting the most perfect solution of engineering problems. I have often found that the most satisfactory results have been obtained by having consultations from time to time with the assistants who may have connection with the work in hand. To invite a free expression of opinion from them and if found desirable to adopt other methods than those proposed by them, to clearly state the reason therefor. By this means all minds are kept in close touch with each other and better results obtained in the execution of any work. Finally, each subordinate should be given full credit for the successful execution of any work which he may have charge of.

In my practice when any new problem is to be considered, the assistants who are likely to be ultimately connected with its design or execution are advised of the fact, the details of what it is desired to accomplish, and all information which would be likely to effect its proper solution so far as known, is laid before them. They are asked to keep the subject in mind. At the proper time we jointly consider the details and perfect our plans. In other words, we all work together to accomplish the best results. By this means united action and loyalty of service are obtained.

### TECHNICAL.

#### Manufacturing and Business.

The Navy Department at Washington is advertising for proposals, to be received by the Bureau of Yards and Docks until June 6, for constructing a 40-ton locomotive crane for the navy yard at Mare Island, Cal.

The following companies have been chartered in Illinois: The J. H. Ohara Air Brake Co., of Chicago; capital stock, \$100,000; incorporators, James Wood, P. L. Randall and H. C. Pooley. The South Chicago Engineering & Contracting Co., of Chicago; capital stock, \$100,000; incorporators, Stephen Creutz, E. Barrington and Charles J. Gummerson.

At a meeting of the Jones Vestibule Sleeping Car Co., held at the Mining Exchange Building, Denver, Col., the following were elected directors: L. T. Kimball, A. C. Fisk, H. A. W. Tabor, H. M. Jones, Marcus Finch, C. D. Wood, George L. Hodges, S. H. Deft, J. F. Bacon and W. E. Finch.

Mr. E. D. Wetmore has purchased the property of the Erie Car Works, limited, at assignees' sale, subject to the judgments of record against the company.

The Railroad Lighting & Manufacturing Company, of Philadelphia, is now making Frost carburetor light equipments for 500 cars for the Pennsylvania. When this order is completed the Pennsylvania system will have over 1,200 cars equipped with the Frost lighting system. The company has orders for the Frost light for 15 new cars now building by the Billmeyer &



Small Company, of York, Pa., for the Norfolk & Western, as well as for a number of other roads. The Frost light is to be used on six new cars of the New York, Ontario & Western; six new cars of the New York, Susquehanna & Western; 15 cars of the Cumberland Valley road; four cars of the New Jersey & New York road, and on a number of new cars of the Atlanta & West Point road.

The Colorado Fuel & Iron Co., of Pueblo, Col., has recently added two Whiting cupolas to its plant. These furnaces have a combined capacity of 25 tons an hour, and were constructed by the Detroit Foundry Equipment Co., Detroit, Mich.

The works of the Westinghouse Machine Co. have been running for a year with a full night force. The shops are crowded with a large amount of heavy work in addition to their regular line of manufacture. There are now building ten 600-H. P. compound engines, of which eight are for the Philadelphia Traction Co., and two are for the Calumet & Hecla mines. The company has just completed the shipment of six 1,000-H. P. engines for the Westinghouse Electric Co., to be used in filling its contract for lighting the World's Fair. These engines are coupled direct to 1,000-light generators. They stand 18 ft. high, and make 200 revolutions a minute.

The Meigs Railway Construction Co. was chartered in West Virginia last week. The incorporators are Joseph V. Meigs, of Lowell, Mass.; William S. Butler, Fred. C. Patch, William J. Dennett, and George H. Towle, of Boston, Mass. The capital stock is \$5,000 paid in, with the privilege of increasing it to \$3,000,000. The charter permits the company to build railroads and do a general contracting business.

The Automatic Car-box Lubricator Co. was chartered in West Virginia last week. The company proposes to introduce a new lubricant for car axle boxes. The incorporators are J. N. Patton, of Rome, O.; Albert Egerly, of Hagerstown, Md.; Albert R. Morrison, of Buena Vista, O.; D. B. Sacks, of Cincinnati, O.; Melville J. Cook, of Hinton, W. Va.

#### Iron and Steel.

The Bessemer Steel Works in Pueblo are now working on a 3,000-ton order of 66-lb. rails for the Atchison, Topeka & Santa Fe. The Burlington has contracted for 25,000 65-lb. rails, and the Denver & Rio Grande 5,000 75-lb. rails. The Union Pacific has an order for 15,000 tons.

#### New Stations and Shops.

The Atlantic Improvement Co., of Long Island City, N. Y., has placed the contract for a new power station, consisting of an engine and boiler house and dynamo room, with the Berlin Iron Bridge Co., of East Berlin, Conn.

The Wabash Railroad shops at Butler, Ind., will be moved to Ashley, Ind., this month.

#### The Sykes Patent Suit.

In the United States Circuit Court of Appeals at Philadelphia last Monday, Judge Butler filed an opinion reversing the New Jersey Circuit Court in the suit of the Union Switch & Signal Company against the Johnson Railroad Signal Company concerning electric signal patents. The matter came up from the decision under which the bill of complaint of the Union Company for alleged infringement by the Johnson Company had been sustained. Judge Butler reviewed the case, and ordered that the decree be reversed, and the bill of complaint dismissed.

#### Proposals for Brooklyn Bridge Station.

The time for receipt of proposals for reconstruction of the New York Station of the New York and Brooklyn Bridge has been extended to Thursday, May 4.

#### Double Deck Screw Ferry Boats.

Some description of the new screw ferry boats built by the Harlan & Hollingsworth Company, of Wilmington, Del., for the Central Railroad of New Jersey was published three weeks ago. Additional particulars of the new boats, which are called the "Easton" and "Mauch Chunk," are given in the following notes. The boats are of exactly the same dimensions. Each of the boats is 158 ft. long, 32 ft. molded beam and 54 ft. beam over guards, 14 ft. 4 in. depth of hold and 9 ft. draft. Plates are steel, frames iron. Their motive power consists of two 7-ft. propeller wheels, one in each end, driven by two compound engines, arranged one forward of the other and working on a continuous shaft, cranks being placed at right angles. The high pressure cylinders are 16 in. diameter, low pressure 30 in. with 22 in. stroke. There are two steel boilers of the straight through type, 19 ft. long and 8 ft. diameter; each boiler has two corrugated steel furnaces, and is built for working pressure of 100 lbs. steam, independent feed and circulating pumps. The lower saloons, 100 ft. long, are furnished with oak, in panels, with French plate glass mirrors every 10 ft. The windows are of new, varied designs, contrasting in a marked degree with the old style of ferry boat windows. The upper saloon, finished with butternut panels, is 80 ft. long and is reached by two wide and easy stairways leading from the lower cabins. The pilot houses are large and well lighted, affording ample room for the manipulation of the hand steering wheels, as well as the Martin's steam steerer, with which this boat and the "Mauch Chunk" are fitted. On the run from Wilmington to New York, while going ahead full speed, the wheel was put from hard starboard to hard port in four seconds. The "Easton" is lighted throughout with electric lights; the dynamo being driven by an 8½ x 10 in. McEwan engine. Steam pipes are arranged to heat the different parts of the boat, and

ventilation is afforded by the many windows and skylights. The engine bulkheads and ceilings below decks are painted white, which gives a bright, cheerful appearance, in marked contrast to the usual dark, grimy engine rooms of propeller ferry boats. The fire hose pumps and all the improved equipments of modern times are distributed about the boat, every care being taken to build and equip a first-class modern ferry boat. The "Easton" arrived in New York Harbor about two weeks ago and the "Mauch Chunk" left Wilmington on April 20. The company has not yet decided when the boats will be put in regular service.

#### The Paris Electric Underground Railroad.

The Berlier tubular underground railroad, Paris, is described at some length with illustration in *Les Annales des Travaux Publics*, of March 15. The general character of the proposed line has already been described in *The Railroad Gazette* on several occasions, and needs not, therefore, to be gone over again. As to the train service, however, it is stated in this latest account that the cars will be run either singly or in sets of three or four to suit the conditions of traffic. A speed of about 20 kilometres (12½ miles) an hour is to be maintained. The cars will be entered from the side, and the entrances will be on a level with the station platforms. The electric current will be taken up by each car by means of copper brushes in contact with a conducting rail laid between the tracks. Each car will be entirely independent so far as motive power is concerned, and the system in this respect will differ materially from the London underground electric line on which electric locomotives are used. As a mark of appreciation of his services in working out the designs for the system, Mr. Berlier has been honored with a gold medal by the Société d'Encouragement pour l'Industrie Nationale.

#### Cast Iron Wheels.

The Committee of the Master Car Builders' Association appointed on cast iron wheels to investigate and report whether there is any substantial difference in wheels made by different methods, such as by solid chills or contracting chills, or by any other difference in process of manufacture, requests answers to the following questions, replies to be addressed to the Chairman at Middletown, N. Y., before May 1:

1. Have you ever practiced the manufacture of cast iron wheels from the same iron, at the same time and in the same foundry in solid chills and in contracting chills?
2. If yes, which chill did you find most advantageous in foundry practice?
3. Have you had any opportunities to compare the service of wheels made in solid chills with the service of wheels made in contracting chills?
4. If yes, how does the service of the two compare as regards broken or cracked wheels?
5. If yes, how does the service of the two compare as regards shelled out or soft places in the wheel treads?
6. If yes, how does the service of the two compare as regards sharp or soft flanges?
7. If yes, how does the percentage of flat wheels which require to be replaced by the manufacturers compare as between wheels made in solid chills and in contracting chills?
8. Have you noticed any less shelling out of wheels that were ground when new than when wheels were mounted without grinding?
9. In general, can you call attention to any improvement in the manufacture of cast iron wheels that has come to your notice that would be of advantage to wheelmakers and users?

GEO. W. WEST, Chairman,  
W. H. THOMAS,  
JOHN FLAYLER, } Committee.

#### Open Hearth Steel Production.

According to Mr. Swank our production of open hearth steel for 1892 was 669,889 gross tons; an increase of nearly 15.55 per cent. over our make of 1891. The British make for 1892 was 1,418,830 tons; or 95,708 tons less than in 1891. Our make was produced in 63 different works, located in 12 states, viz.: New Hampshire, Massachusetts, New York, New Jersey, Pennsylvania, Alabama, Ohio, Indiana, Illinois, Michigan, Missouri and California. The development of open hearth steel production in this country has been very slow. This is partly due to the absence of shipbuilding and also to the litigation over the open hearth steel patents. For the past two years the British production of Bessemer steel has been less than of open hearth steel; they having produced more than twice as much open hearth steel as we. On the other hand, our production of Bessemer steel ingots last year was 4,168,435 gross tons, as against a British production of 1,458,743 tons. Our production, however, has increased since 1886 by almost 206 per cent. and the production of Great Britain has increased during the same time but 104.5 per cent. and Secretary Herbert as Chairman of the House Naval Committee calls attention to the fact that: "The price of the materials entering in the composition of a modern ship (greatly open hearth steel) has been reduced fully one-half," which he lays to the laws of Aug. 3, 1886, providing that all materials employed in building and armoring our war ships should be of American origin.

#### THE SCRAP HEAP.

##### Notes.

A freight conductor and engineer were fined \$25 each at Philadelphia, last week, for blocking a street crossing 12 minutes.

The leader of the Piedmont train robbers has been sentenced to imprisonment for life at Birmingham, Ala. Two companions got off with six years and five years respectively.

It is reported that the Empire State express recently ran from Syracuse to Buffalo, 149 miles, in 150 minutes, and it is said that between Palmyra and Macedon one mile was traversed in 38 seconds, equal to 94.7 miles an hour.

The Pennsylvania Railroad has increased the pay of the baggagemen on the New York City ferryboats and at the ferry terminals. The increase was made without notice, and, according to the reporters, the men were at first benumbed.

The North Carolina Railroad Commissioners have issued an order to the roads of the state requiring them to provide means and appliances for careful handling of baggage. Where the station force is not sufficient "it shall be required of the train hands to assist the baggagemaster and lift with care all baggage from the car doors."

The Railroad Commissioners of Missouri have ordered important repairs to be made at once at various points on the St. Louis, Cape Girardeau & Fort Smith road, the track at some places being in dangerous condition. The road is very poor, and has to struggle to maintain its existence. Very low speed is recommended at various points.

A San Francisco paper states that the officers of the Railway Mail Service have had to curtail the issuance of permits for employees of the department and others to ride in mail cars when off duty, the use of these documents having become so common that many free rides were stolen by means of them, the conductors on the trains being careless.

The Iowa Railroad Commissioners have lately decided, in the case of a complaint against the Chicago, Burlington & Quincy and the Chicago & Great Western, alleging that they do not provide proper facilities at a junction point, that better facilities for baggage transfer must be provided; "something better than hauling the baggage up and down 60 steps."

An Iowa Court has recently rendered a decision sustaining the State Railroad Commissioners in their order requiring the Chicago, Milwaukee & St. Paul to put up a station building at Boughton, a small town in the western part of the state. The road had resisted the order on the ground that the Commissioners had authority only to recommend. The decision was by Judge H. C. Deemer.

Several hundred machinists, blacksmiths and other artisans in the shops of the Union Pacific, at Omaha, struck on April 17, and men at other points on the line of the road also left work, the claim being made that the company had not kept its agreement concerning the reduction of force when work was slack. The press dispatches spoke of large numbers leaving work at many places, but a good many returned to work on the following day, and it is not clear that the strike has much importance. Officers of the company say that there will be no inconvenience if the shops stand idle for some time. The situation on the Atchison, Topeka & Santa Fe seems to be about the same as on the Union Pacific.

#### World's Fair Notes.

The Thatcher Car & Construction Company has sent to the Transportation Building one of its class C cars, and will ship a class B car before the Fair opens. The company has been allotted space near the air brake exhibits.

An interesting feature of the railroad exhibit at the Chicago fair will be a series of water color paintings of the St. Gothard Railroad, by J. Weber, a carefully worked out pictorial representation, by Prof. Fr. Becker, of the topographical conditions encountered in the approaches to the tunnel.

The first consignment of the great diorama of the French Transatlantic Steamship line was received Monday and taken into the Transportation Building. This exhibit contains over 8,000 ft. of canvas, on which have been portrayed by La Motte, of Paris, many harbor and sea scenes and several of the vessels of the company. It was exhibited in Paris in 1889.

The finishing touches upon the pier movable sidewalk are now being made. The last consignment of trucks has reached the park, and when placed upon the track will complete a continuous line of trucks a mile long. The long umbrella-like roof of the structure is nearly finished, and as soon as the electric power is furnished the walk will be in operation.

The Georges Creek Coal & Iron Co., of Maryland, has shipped to Chicago for exhibition at the World's Fair a block of coal of the following dimensions: 14 ft. 8 in. x 3 ft. 6 in. x 4 ft. The greatest dimension represents the depth of the seam of coal in which the company works. The block was taken out after great difficulty and was bound by steel bands so that it shall not be broken in transit. The weight of the block is about ten tons.

A fleet of full-rigged models showing the development and growth of the Cunard steamship line, from the steamship "Britannia," built in 1840, down to the "Campania," the largest steamship in the world, will be exhibited. These models have been in course of construction for over a year at the Cunard company's yards in Liverpool. The joiners sent out from Liverpool especially for the purpose are now engaged in the work of installation. The models are inclosed in handsome glass cases and rest upon carved tables of oak; an ivory tablet giving a full description is attached to each case. In addition to the models it is intended to display photographs, etc., of modern ships, including the latest additions, the "Campania" and "Lucania," upon screens provided for the purpose.

After many vicissitudes it is now decided that the Barre Sliding Railroad will be a feature of the World's Fair. A couple of months ago the project was almost as good as given up, but now the railroad is an assured fact. The company had been badly handicapped by various circumstances, and not a little by the Exposition authorities themselves. This was fully realized recently, and it was decided to grant the company an extension of time. D. J. Thayer, President and General Manager



of the new company, states that by the end of the first week in May one train will be in motion on the railroad. The Exposition Company has given until May 15 to have one train in operation for half the length of the line, and till June 1 to have the whole system completely equipped. The viaduct which the company is now building over Woodlawn and Stony Island avenues will be finished May 1. The cars for the first train will be on the ground about a week from now. All of the rails are made and some of them are now on their way from the Carnegie mills.

The Illinois Central Railroad Company has arranged for a new place for landing its World's Fair traffic. The passengers are to be dropped outside the gates and not at the terminal station inside the grounds. The original plan of the company was to run its trains to Seventy-first street, thence around a curve south of the grounds and into the terminal station inside the grounds. Now the company has perfected a plan by which all its trains, save those in through traffic, are to be stopped between Fifty-ninth and Sixtieth streets. The trains from the city will, as soon as they are emptied, be switched to the opposite track and pushed back to the downtown stations. This will save the company about two miles in the roundtrip of trains, considerable time, and, it is estimated, about \$1,000,000.

So far as the public is concerned the plan is thought to be better than the old one. Passengers landing at the terminal station will have to walk back nearly to Fifty-ninth street to the Fair, and those who are let off at Fifty-ninth street will have but a short walk to the gates.

#### Lake Notes.

Work on the 20-ft. channel will be commenced at Grosse Pointe Flats in the course of a few days. One of Breyer Bros.' big dredges arrived on the flats on the 17th, and another is expected in a few days.

Ore freights seem to be opening at a lower rate than last year. The Pewabic Company has placed a charter for 200,000 tons of iron ore from Escanaba to Lake Erie ports at a price not yet announced, but which is understood to be below 95 cents, the rate for last season.

The ice in the Straits of Mackinac broke up on the 13th instant, but the first boat, the "Philip Armour," did not pass through until the 17th. She was followed by eight other steamers and the season for the lower lakes is fairly opened. The amount of grain loaded and ready to come down is about 10,000,000 bushels, though, as the Straits opened earlier than was expected, all the boats will not get off in a bunch and a blockade at Buffalo will probably be averted. The first boat out of Buffalo, coal laden, started on the 14th.

Great indignation is expressed at Buffalo on account of the tardy opening of the Erie canal. Superintendent Hanan announces that it will not open on May 1, which is the usual date, and fails to say when it will open. This is a matter of great importance to the canal men, particularly those who wintered their boats on the Hudson, as they will probably lose the freightage of the first shipment now sailing from Chicago. The Merchants' Exchange, of Buffalo, has appointed a committee to go to Albany and investigate the cause of the delay.

#### Lake Superior Traffic.

The marine season at the head of Lake Superior is a little slow in opening and it is not expected that many vessels will be able to get to Duluth until about May 15. Last year 12,000,000 bushels of wheat had been shipped from the local elevators before that date, the first vessel arriving on April 22.

In the year 1892 the tonnage moved to and from the docks at the head of the lakes was in round numbers 7,000,000 tons, or about two-thirds what the port of Chicago handled. Large as this traffic was in 1892, it will be largely increased this year, unless all signs fail. From Two Harbors, a sub-port of the Duluth custom district, there went forward in 1892 over 1,170,000 tons of iron ore. This year the same docks will handle at least 1,500,000 tons, while Duluth itself, which has never shipped any ore, expects to send forward 1,000,000 tons. In this item alone last year's business is doubled and cargoes of the largest size are furnished 1,400 vessels. The wheat last year shipped from Duluth and Superior amounted to 33,000,000 bushels. Now there are in store and in vessels for early shipment 18,000,000 bushels of grain, 4,000,000 more than a year ago, and the supplies in country elevators are very large, assuring wheat shipments for the season, if the crop of this year is up to the average, several million bushels more than in 1892. In coal, receipts of which were 1,951,000 tons in 1892, there must be an increase of probably 600,000 tons.

The dock and transportation companies, which carried over to the season of navigation a year ago 350,000 tons of coal, will this spring carry hardly a ton. At an average cargo of 1,800 tons for the coal fleet, this business will give loads for 1,400 vessels or about the same number as the ore fleet down. Shipments of flour last year were 4,763,000 bbls. With the large additions to local milling capacity, which will be 16,000 bbls. a day by July, and with the shipments from Minneapolis for delivery here to vessels, which, until a year or two ago, constituted the entire flour business of Duluth, the business for 1893 will exceed by several hundred thousand barrels that of last year. Flour shipments for 1893 will probably foot up 550,000 tons, of which home manufacturers, who, three years ago were not in existence, will send out 200,000 tons. Lumber shipments to Chicago and Buffalo, which last year were 50,000,000 ft., employing 100 vessels, will, this year, be 110,000,000 ft. Three years ago the lumber shipments from Duluth had never exceeded 20,000,000 ft. a year.

Three new lines of package freight ships, running in connection with Eastern trunk roads, have made arrangements to use Duluth as a Western terminal point. It is an addition also to the combination formed between the Lehigh Valley and the Great Northern roads last December, by which the freight of the former for the Northwest will be handled by the latter's fleet of steel ships through Duluth and Superior. This traffic, as well as that of the Ogdenburg line, which is also to run a fleet of vessels in the Duluth trade hereafter, has heretofore gone via Chicago. The Northern Steamship Co., the Great Northern's lake steamer line, is now building for the Duluth-Buffalo passenger traffic two passenger vessels at a cost of \$1,200,000, which will be as fine boats as sail under the American flag, except only the "New York" and "Paris." They are guaranteed for a sustained speed, in deep water, of 28 miles an hour, and will make the 1,000 miles between Duluth and Buffalo, including shallow water, narrow channels and stops in 50 hours. Over 100,000 tons of freight tonnage, mostly steam and steel, has been built in the past winter for the lake business, largely for this Lake Superior trade.

#### South American Railroads.

It seems that the charter of the São Paulo Railroad, from the port of Santos, Brazil, precludes the proposed

extension of a competing branch of the Mogiana Railroad to the coast, so that the only means of affording relief to the congested traffic of that region will be through a fusion of the Mogiana Railroad with the Sorocabana System. This consolidation of interests is likely to take place within the next few weeks.

An interesting statement concerning the efficacy of laborers working at high altitudes has been made by Mr. Lane, engineer in charge of the work of construction on the Central Railroad, Peru. He finds no diminution in the quantity of work performed *per diem* by a given number of workmen up to an altitude of 10,000 ft., as compared with that done at sea level. When 12,000 ft. are reached efficiency diminishes, and at 14,000 to 16,000 ft. the amount of labor performed falls off fully one-third. After a fortnight the workmen begin to regain their former capability to endure hard and long continued work, which finally reaches a maximum somewhat lower than that shown at lower levels. This is in accord with the observations of Mr. Edward Whymper, who studied this question carefully in the high Andes of Ecuador. Mr. Whymper concluded that mountain sickness could be entirely overcome by gradual habituation to lower barometric pressures, and that when this had been attained no difficulty would be experienced in doing a fine amount of work even as high as 18,000 ft. above the sea, and he found it possible to endure severe exertion without serious difficulty even up to the limit of 20,000 ft.

#### Railroad Regulation in Mexico.

A dispatch from the City of Mexico, April 16, states that a new law governing the railroads of Mexico has just gone into effect. It provides that all tariffs must be approved by the government, prohibits the payment of rebates, and discrimination generally. It prohibits ticket-scalping, the operation of contracts or revenue pools, and gives the government the right to say what rates shall govern, fixing severe fines and penalties for violation by companies, officials or agents. It prescribes the maintenance in Mexico City of a complete record of all business, income and disbursement of the roads, and prohibits the purchase, rental or the acquisition of a connecting road.

#### A World's Fair Issue of Engineering.

Doubtless our readers remember the remarkable Exposition number of *Engineering*, which was got out during the Paris Exposition in 1889. A similar issue of that journal will appear April 21, to illustrate the Columbian World's Fair. A notion of the size of this issue is given by the statement that each copy will weigh three pounds.

#### British Iron & Steel Institute.

It will be news to the great majority of the members of the Iron & Steel Institute when they learn that they are on the eve of having a new Secretary. This is the fact, Mr. J. S. Jeans having handed in his resignation to the Council. Mr. Jeans has been Secretary for some sixteen years, and during his period of office the membership and influence of the Institute have increased in a remarkable degree. Mr. Jeans will be much missed, and will have the good wishes of the members for his future prosperity. He retains the secretaryship of the British Iron Trade Association, which will shortly remove to new offices at 29 Great George street, Westminster. The new Secretary of the Iron & Steel Institute will be Mr. Bennett H. Brough, who is very well known in connection with the School of Mines.—*Ironmonger*.

#### The Delagoa Bay Railroad.

This road which has been in a slow-going arbitration since the Portuguese seized it in 1889 for non-completion of contract, when above 56 miles were built, is now being pushed with some vigor by the Netherlands Railway Company, an organization avowedly Dutch but having a large ownership in Berlin. At the end of the year about 140 miles, from Delagoa Bay to Alkmaar, were completed, and it is expected the whole distance to Pretoria, 346 miles, will be completed by the end of 1894. Fifty-six miles of this will be Portuguese and 290 miles Dutch.

The part of a road built by the English company was through an easy country, with no grades over two per cent., but there is heavy work on the extension. The summit, 214 miles from Delagoa Bay, is 6,437 ft. above the sea, and is reached by a rack and pinion road, with a 5 per cent. grade which runs for 2½ miles of its length through tunnels. There is also a bridge with seven 100-foot spans. The gauge is 3 ft. 6 in., and the rails weigh from 80 to 90 lbs. per yard; they, with the bridges and all of the rolling stock, except a few heavy engines, are furnished by Messrs. Bochum & Co.

The Netherlands company will also build branches from the main line aggregating some 180 miles in length, which are to be completed within three years from the date of the concession. It is a pity that for so large a country as Africa a 3-ft 6-in. gauge should be so generally adopted.

#### Baltimore & Ohio World's Fair Souvenir.

Maj. J. G. Pangborn will publish a souvenir volume in connection with the Baltimore & Ohio's exhibit at Chicago, of the evolution and development of the world's railroads. It will be printed upon paper of exceptional quality, and there will be more than 150 plates in three colors, illustrative of the evolution and development of motive power from Sir Isaac Newton's initial idea of steam propulsion on land in 1680 to the compound locomotive of to-day. Artists are engaged upon the drawings and also on an additional series of pen and ink and wash sketches, numbering over 100, which will embrace track, equipment and appliance studies, together with portraits of men identified with railroad progress. The volume will be of royal quarto size, the binding morocco, and each copy will be encased in a special box. The edition will be limited and the distribution will be by President Mayer, of the Baltimore & Ohio.

#### Russian Expenditures on Public Works.

The Russian budget provides for an expenditure of about \$38,750,000 on public works during this year. Of this sum \$20,000,000 will be expended on the construction of the Siberian railroad, which is being pushed with energy toward Omsk. About \$5,000,000 will be expended on rolling stock. Most of the balance will be expended on harbors, etc.

#### Pikes Peak Cog Railroad.

Trains will be started early in May and the line will be opened to the summit of Pikes Peak about June 1. In anticipation of a great tourist traffic this year the company has purchased new equipment. The company will be able to handle 1,000 people a day. At the earliest day possible operations will be commenced upon a two-story hotel to be erected this summer on the summit of the peak. The hotel will accommodate 50 guests. The building will be constructed of stone and the walls will be 3 ft. thick, in order to withstand the winter hurricanes which sweep over the peak.

#### Let the Superintendent Make the Excuses.

The Galveston (Tex.) *News* prints the following specimen of railroad rhetoric "as a matter of general interest and information":

To all agents: Our New York owners will be out to inspect their property between the 3d and 8th of February. I desire that you have your windows washed, floors scoured and all paper and trash of every kind piled and burned out of sight not later than the 2d of February, and I want your depots, waiting rooms and faces kept clean until after this inspection, and for once, if this inspection should find your station in an untidy condition I hope you will not try to out-talk me with the excuse that you had a dirty crowd the night before.

Each station where a regular porter is not employed will be allowed from 25 cents to \$1 for this sanitary movement, and stations that employ regular porters will be specially dealt with if these instructions are not carried out.

#### The Elizabeth Improvements.

Work has progressed steadily on the Pennsylvania elevation at Elizabeth, N. J., during the past week. The trestle has been erected across Pearl street, thus closing the last gap in the temporary structure which elevates the two eastbound tracks. At the main station the platforms for the temporary overhead station are laid on the trestle from the line of Morris avenue to West Jersey street, a distance of about 800 ft. At the Broad street-Morris avenue crossing both tracks are laid over the north Broad street crossing; those of the four girders for the permanent bridge over the Central of New Jersey tracks are in place and the floor beams and tracks are laid for the outer track; all of the temporary girders spanning the opening from Morris avenue to the Central of New Jersey station are in place, and but a few feet of track remains to be laid to make the outer eastbound track continuous over the whole elevated structure. This track will probably be opened for regular travel on Monday next.

#### Convention of Railroad Commissioners.

The fifth annual convention of State Railroad Commissioners met in Washington on Wednesday. There was a large attendance, including a large number from the American Accounting Officers' Association. George M. Woodruff, of Connecticut, called the convention to order. Permanent organization was effected by the selection of Mr. Woodruff as Chairman; William S. Chantrell as Vice-Chairman, and Edward A. Moseley, Secretary. After an address by Mr. Woodruff the committee appointed to arrange an order of business submitted its report. Peter A. Dey, of Iowa, presented the report of the Committee on Reasonable Rates, which was adopted. Similar action was taken on the reports submitted by James C. Hill, of Virginia, on Congressional action in regard to safety appliances. The committee suggested that the objects for which it was appointed having been accomplished, it should be discharged, which was ordered.

At the afternoon session Mr. Mortland, of Maine; Mr. Hill, of Virginia, and Mr. Hennessy, of Missouri, spoke of the need for uniformity in methods of car coupling. The question of demurrage was discussed. The meeting was continued on Thursday.

#### Midland Rapid Transit—Chicago.

We mentioned last week that an ordinance had passed the Chicago City Council granting the right to construct and operate an elevated railroad in Chicago, West Side, to the Midland Rapid Transit Railroad. The ordinance was vetoed by the Mayor, and an attempt to pass it over his veto was not successful. One reason given for the veto is, that, "the route provided by the ordinance is, for a considerable portion of the way, in close proximity to the roads already occupied by other bona fide companies which are already in operation or in actual process of construction." The veto refers to the dangers of building a tunnel under the business portion of the city, near the very high buildings, in the following words: "The provisions of the ordinance authorizing the company to construct a tunnel under the main business portions of the city of such size as to permit of two or four railroad tracks, curves, side-tracks, etc., is a serious one, and in my opinion should never have been granted without thorough investigation by competent engineers, and their report that such tunnel could be so constructed and operated without danger to buildings and structures above and without a complete disclosure and satisfactory showing that the company and the persons behind it are possessed of sufficient responsibility to respond to any damages that might result, and without a more complete provision for the sure payment of such damages. It is well known that the character of the soil under our city is such as to make the safe construction of such tunnels difficult and risky, if not impossible, and the question whether they can be constructed with safety to the buildings has been a mooted one, and that it is the opinion of many competent experts that this cannot be safely done."

#### LOCOMOTIVE BUILDING.

The Richmond Locomotive & Machine Co., of Richmond, Va., has an order for a number of heavy engines for the Seaboard Air Line route. The number is reported to be 12 locomotives.

The New York & New England this week gave orders to the Baldwin Locomotive Works for 10 heavy mogul engines. Five of these locomotives are to be delivered by June 10, and the other five a month later. These locomotives will be some of the largest freight engines used on the road, their weight being without the tender 128,000 lbs. each, with cylinders 20 x 26 in.

#### CAR BUILDING.

The Seaboard Air Line has placed orders for 12 vestibuled cars with the Pullman Car Company.

The Toledo & Ohio Central has this week let contracts for the construction of 300 box cars and 560 coal cars.

#### BRIDGE BUILDING.

Anderson, Cal.—A bridge is to be built across the Sacramento River, near Anderson, for the Shasta lumber railroad, now building.

Beaver Falls, Pa.—The Penn Bridge Co., Beaver Falls, has been awarded a contract for a bridge across the Monongahela River at Elizabeth, Pa., one span 365 ft., and two spans of 300 ft. each, 18 ft. roadway. Also a contract for bridge at P street, Washington, D. C., 112 ft. span, 40 ft. roadway. In addition several smaller contracts have been received.

Easton, Pa.—The Northampton County Grand Jury has filed a report condemning the wooden toll bridge across the Delaware River at this place and owned by the Easton-Delaware Bridge Co. The structure was built over 70 years ago. A bill has been introduced at Harrisburg to annul the charter of the company.



**Harper's Ferry, W. Va.**—The Vulcan Bridge & Road Machine Co., of Charlestown, W. Va., which has the contract for building the new bridge over the Shenandoah River at this point, is progressing rapidly with the work, and has the second span almost completed. The bridge will be completed in a few weeks.

**Homestead, Pa.**—The plans for the proposed iron toll bridge from the twenty-third ward, Pittsburgh, to Homestead, which is to be built by the Homestead & Pittsburgh Bridge Co., were approved last week, and it is expected to begin the erection of the bridge by July 1.

**Kanawha & Michigan.**—The bridges which this company is building at the mouth of Gauley River and at Narrows Falls, in West Virginia, on the branch to connect with the Chesapeake & Ohio are nearing completion. The one at the mouth of Gauley River will be ready for use in a few weeks. The one at Narrows Falls is of heavier construction and is not so far along. Work is being pushed to make up for the time lost on account of bad weather last winter.

**Macon, Ga.**—The citizens who are interested in the construction of a new bridge over the Ocmulgee River, have induced the county commissioners to order their engineers to procure estimates of the cost of the bridge across the river at First street, and it is expected that they will order its construction at their next meeting.

**Martinsburg, W. Va.**—The Martinsburg & Winchester Turnpike Co. will receive bids till April 20 for the construction of a new highway bridge over Mill Creek on the Martinsburg & Winchester turnpike. The plans and specifications are at the company's office at Martinsburg.

**Natchitoches, La.**—The contract has been awarded to the Youngstown Bridge Co. to build an iron bridge across Cane River, opposite Natchitoches. The cost will be \$15,500, of which amount the sum of \$12,000 has been subscribed by the city, and \$3,500 by the Cane River Bridge Co. The bridge is to be 16 ft. in width and 480 ft. in length, with a draw of 93 ft.

**Philadelphia.**—The Bureau of Surveys has completed plans for a new bridge across the Schuylkill River at Gray's Ferry, and a conference upon them will be held between the railroad officials and the Chief of the Bureau of Surveys on their adoption in a few days. The plans provide for a double-decked iron drawbridge with a span of 325 ft. On the upper deck will be the wagon driveway, and on the lower the railroad tracks. The upper deck is to be 65 ft. and the lower 35 ft. above the water.

**Port Burwell, Ont.**—The Public Improvements Committee of the Elgin County Council have decided to replace the present bridge across the Otter River with a Howe truss structure, at a cost of about \$2,000.

**Schenectady, N. Y.**—Governor Flower, of New York, has signed a bill providing for an overhead crossing of the New York Central & Hudson River Railroad over Edison avenue, Schenectady.

**Stockton, Cal.**—The contract for a bridge over Mormon channel was awarded last week to the Stockton Bridge Company for \$3,240.

**Unadilla, N. Y.**—The old river bridge across the Susquehanna River just east of this village, built in 1816, has been condemned by the Highway Commissioner as unsafe. A new iron suspension bridge will soon take its place.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

*Nashville, Chattanooga & St. Louis*, quarterly, 1½ per cent, payable May 1.  
*Toledo & Ohio Central*, quarterly, 1½ per cent., on the preferred stock, payable April 25.  
*Wheeling & Lake Erie*, quarterly, 1 per cent., on the preferred stock, payable May 15.

##### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Canadian Pacific*, special, Montreal, Que., May 10.  
*Central of New Jersey*, annual, Jersey City, N. J., May 5.  
*Chesapeake & Ohio Southwestern*, special, Memphis, Tenn., June 13, to approve of the purchase of the Hodgenville & Elizabethtown.  
*Chicago Burlington & Quincy*, annual, Chicago, May 17.  
*Cincinnati, Jackson & Mackinaw*, annual, Toledo, O., May 1.  
*Cleveland, Chicago & St. Louis*, special, Cincinnati, O., May 10.  
*Delaware & Hudson Canal*, annual, New York City, May 9.  
*Eastern of New Hampshire*, annual, Portsmouth, N. H., May 2.  
*Grand Trunk*, semi-annual, London, Eng., April 24.  
*Kansas City & Omaha*, annual, Fairfield, Neb., May 2.  
*Lake Shore & Michigan Southern*, annual, Cleveland, O., May 3.  
*Mexican Central*, annual, Boston, Mass., May 3.  
*Michigan Central*, annual, Detroit, Mich., May 4.  
*Missouri, Kansas & Texas*, annual, Parsons, Kan., May 17.  
*New York, Chicago & St. Louis*, annual, Cleveland, May 3.  
*New York, Susquehanna & Western*, special, Jersey City, N. J., April 25.  
*Norfolk & Western*, annual, Roanoke, Va., May 3.  
*Omaha & St. Louis*, annual, Stanberry, Mo., May 16.  
*St. Louis, Alton & Terre Haute*, annual, St. Louis, Mo., June 5.  
*Staten Island Rapid Transit*, annual, New York City, April 25.  
*Union Pacific*, annual, Boston, Mass., April 26.  
*Wyoming & Utah*, annual, 28 School street, Boston, Mass., May 11.

##### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Association of American Railway Accounting Officers* will hold its fifth annual meeting at the Auditorium Hotel, Chicago, commencing May 31.

The *Railway Agents' Association of North America* will meet at Old Point Comfort, Va., on Tuesday, May 16.

The *Western Railway Club* meets at the rooms of the Central Traffic Association in the Rookery Building,

Chicago, on the third Tuesday in each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 7.30 p. m.

The *Northwest Railroad Club* meets at the Ryan Hotel St. Paul, on the second Tuesday of each month, except during June, July and August, at 8 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Western Society of Engineers* meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

The *Engineers' Club of St. Louis* meets in the Odd Fellows' Building, corner Ninth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' Society of Western Pennsylvania* meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 8 p. m.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers* meets at 38 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday except during the months of June, July, August and September.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 919 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Tacoma Society of Civil Engineers and Architects* meets in its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

The *Association of Engineers of Virginia* holds informal meetings the third Wednesday of each month, from September to May inclusive, at 719 Terry Building, Roanoke, at 8 p. m.

##### Association of Engineers of Virginia.

The next informal meeting will take place at the association's rooms in Roanoke on April 26 (postponed from April 19) at 8 p. m. Subject for discussion, Aluminum, the discussion to be opened by Mr. J. C. Bawn. Alternative subject, Proper Method of Sewage Disposal in Isolated Building where no Drainage System is Available, the discussion to be opened by Mr. R. P. C. Sanderson.

##### Canadian Society of Civil Engineers.

The regular meeting was held at the society's rooms, 112 Mansfield street, Montreal, April 20. A paper on "The Results of Tests of White Pine of Large Scantling," by Prof. Henry T. Bovey, M. A., M. Can. Soc. C. E., was read by the author. There was also a discussion on Mr. J. S. Armstrong's paper on "Transition Curves."

##### Engineers' Club of Cleveland.

The regular meeting was held April 11, with President Porter in the chair and 50 members and visitors present.

The following calendar was arranged for the coming year: 1893.—May 9, Architecture; June 13, Railroad Engineering; July 11, Electrical Engineering; Aug. 8, Civil Engineering and Surveying; Sept. 12, Mechanical Engineering; Oct. 10, Applied Science; Nov. 14, Marine and Steam Engineering; Dec. 12, Hydraulic and Sanitary Engineering. 1894.—Jan. 9, Electrical Engineering; Feb. 13, Civil Engineering and Surveying; March 13, Annual Meeting, and April 10, Applied Science.

Messrs. M. E. Rawson, C. W. Paine and I. M. Wolverton were appointed a committee to assist in making arrangements for the coming meeting of the Ohio Society of Surveyors and Civil Engineers.

Mr. C. F. Uebelacker then read a paper on "Electric Railways." The paper was discussed by Messrs. John W. Langley, C. W. Foe'e, J. Leon Gobeill, A. H. Porter and Ludwig Herman.

##### M. C. B. Committee on Cast-Iron Wheels.

The committee appointed on cast-iron wheels to investigate and report whether there is any substantial difference in wheels made by different methods, such as by solid chills or contracting chills, or by any other difference in process of manufacture, requests answers to the following questions, replies to be addressed to G. W. West, Chairman, at Middletown, N. Y., before May 1: (1.) Have you ever practiced the manufacture of cast-iron wheels from the same iron, at the same time and in the same foundry in solid chills and in contracting chills? (2.) If yes, which chill did you find most advantageous in foundry practice? (3.) Have you had any opportunities to compare the service of wheels made in solid chills with the service of wheels made in contracting chills? (4.) How does the service of the two compare in the following particulars: As regards broken or cracked wheels? (5.) As regards shelled out or soft places in the wheel treads? (6.) As regards soft or sharp flanges? (7.) If yes, how does the percentage of flat wheels which require to be replaced by the manufacturers compare as between wheels made in solid chills and in contracting chills? (8.) Have you noticed any less shelling out of wheels that were ground when new than when wheels were mounted without grinding? (9.) In general, can you call attention to any improvement in the manufacture of cast-iron wheels that has come to your notice that would be of advantage to wheel makers and users?

##### New England Railroad Club.

At the meeting held on Wednesday evening, April 12, President Chamberlain occupied the chair, and the Secretary read a communication from Secretary Cloud, of the Master Car Builders' Association, asking for suggestions as to desirable modifications in the rules of interchange, and on motion of Mr. F. D. Adams a committee was appointed by the chair to make such recommendations to the Arbitration Committee as they may deem expedient on or before May 10, and the Chair appointed Messrs. Lauder, Adams, Marden, Robertson, Goldon, Coughlin and Chamberlain.

The President announced as the subject for discussion at the next meeting of the Club "The Desirability of having Standard Trucks and Foundation Brake Rigging for Freight Cars, and the Influence this would have on Repairs," the subject to be opened by Mr. James N. Lauder. He announced as the subject for the present occasion "The Past Winter's Experience in the Continuous Heating of Passenger Trains," and requested Mr. F. D. Adams to open the subject. The discussion is reported in another column.

##### PERSONAL.

—Mr. J. T. McBride, Division Superintendent of the Illinois Central, in charge of the Chicago terminals, has resigned.

—Mr. Joseph S. Harris, who was elected President of the Philadelphia & Reading Railroad on April 8, this week accepted that office and also the presidency of the Philadelphia & Reading Coal & Iron Company.

—Mr. L. C. Brastow, Division Master Mechanic of the Central of New Jersey, at Wilkes-Barre, Pa., died at that town April 15, where he had lived for the last twenty years, having charge of the motive power on the Lehigh & Susquehanna Road.

—Mr. Emile Low, M. Am. Soc. C. E., now a Division Engineer on the Norfolk & Western, is an applicant for the position of consul to Paso del Norte, Mexico. We hope that he will not get the position, for he is too good a man to be taken out of the active practice of his profession.

—Mr. Charles R. Peddle, General Purchasing Agent of the Vandalia line, died April 19 in Terre Haute, Ind. He had been connected with the Terre Haute & Indianapolis road, better known as the Vandalia, ever since it was built in 1851, and he bought the first four engines used on the road.

—Mr. Robert Hitchcock, Master Car Builder of the Connecticut River Road, resigned this week, after a service with that company of over 41 years, having begun as a car inspector of the road in 1851. At that time Mr. John Mulligan, recently President of the company, was Master Mechanic.

—Mr. James Dredge, editor of *Engineering* (London), arrived in New York a week ago, and has gone to Chicago, where he will remain for some months as Royal Commissioner to the World's Fair. A dinner was given to him at the Engineers' Club in New York City, Saturday night, April 15, which was well attended and was very enthusiastic and appreciative.

—Mr. George C. Ewing, formerly connected with the railway department of the General Electric Company, has resigned to accept the position of Superintendent of the Safety Brake Shoe Co., 620 Atlantic avenue, Boston, Mass. Mr. James J. Slides has resigned his position with the West End Street Railway Co., of Boston, to accept one as traveling salesman for the Safety Brake Shoe Company.

—Mr. E. T. Collbran, Acting General Freight Agent of the Colorado Midland, died in St. Luke's hospital, Denver, on April 16, age 29 years. He was born in England and his first position in this country was in the freight department of the Cincinnati Southern, where he remained until 1888 when he became Chief Clerk of the Freight Department of the Colorado Midland. He retained that position until a few months ago, when he became Acting General Freight Agent. His brother, Mr. H. Collbran, is General Manager of the Colorado Midland.

—Mr. A. C. Kendall has resigned his position as General Passenger Agent of the New York & New England road, to take effect May 1, when he will become General Passenger Agent of the Old Colony division of the New York, New Haven & Hartford, which includes, besides the Old Colony, the New York, Providence & Boston, and Providence & Worcester lines. Mr. Kendall has been connected with the Boston, Hartford & Erie and New York & New England roads for upward of 26 years, and for the last 24 years has been General Passenger Agent.

—Mr. David Preston, Mechanical Superintendent of the Canadian Pacific, died at Montreal on April 3, of blood poisoning. He had undergone two operations, the amputation of his foot and then of his leg, and the exhaustion from these operations caused his death. He was in his 66th year. Mr. Preston began his railroad career as a fireman on the Grand Trunk road. His promotion was rapid and he was Division Master Mechanic of the Grand Trunk at Toronto when he was appointed Master Mechanic of the Eastern Division of the Canadian Pacific. Three years ago he became Mechanical Superintendent with headquarters at Montreal.

—Mr. Adolphus Bonzano, Vice-President and Chief Engineer of the Phoenix Bridge Co., completed 25 years in the service of that company on April 14, and about 30 of the engineers and draftsmen in the works at Phoenixville commemorated the anniversary by presenting to Mr. Bonzano a beautiful bronze bust, supported on a pedestal of Mexican onyx, as an expression of esteem and good will. The bust, representing a young scholar, is by the French sculptor Picault, and was exhibited at the Paris Salon of 1892. It stands, with the pedestal, about 6 ft. high. The speech was made by M. G. Lippert, chief of the drawing-room of the Phoenix Bridge Co.

—Mr. James A. Case, Assistant Statistician of the Interstate Commerce Commission, resigned last February, to take effect April 30. He will take up the practice of the law, and will probably make some connection where his large knowledge of railroad statistics and railroad finance will be useful. He is a graduate of the University of Michigan, and took a degree of LL.B. at the Columbia University in Washington. For over four years he has been Assistant Statistician to the Interstate Commerce Commission, and has had administrative charge of the work of the office under Prof. H. C. Adams. On Mr. Case has been devolved the great mass of the office work, and we believe that it is not too much to say that he has conducted that work with singular ability.



## ELECTIONS AND APPOINTMENTS.

**Baltimore Forwarding & Railroad Co.**—W. R. Crumpton, General Manager, has been elected Second Vice-President and is to have charge of all new work, including the standard-gauging of the road. S. M. Manifold, formerly Yardmaster of the Pennsylvania at Washington, D. C., has been appointed Master of Transportation.

**Blackwater Valley.**—The first annual meeting under the new charter was held recently at Webster, Me. Charles C. Coffin, of Boston; Charles A. Sinclair, of Portsmouth; John C. Pearson, of Boscaawen; Daniel C. Stevens, of Salisbury, and William W. Burbank, George Little and Henry W. Gerrish, of Webster, were chosen directors. The directors elected Hon. Charles C. Coffin, of Boston, President, and William W. Burbank, of Webster, Clerk.

**Canadian Pacific.**—G. H. Eaton, Master Car Builder of the shops at Toronto, has been promoted to the company's shops at Hochelaga, Que.

**Cleveland, Akron & Southern.**—The new officers for this week announced several appointments and changes. John J. Henry has been reappointed Superintendent and Master Mechanic, A. D. Dunning has been reappointed Auditor and becomes also Assistant Treasurer; formerly he was Secretary and Treasurer as well as Auditor. James Harrington has been reappointed Chief Engineer; the office of General Superintendent, which he formerly held, in addition to that of Chief Engineer, has been abolished. The headquarters of all the above officers will be at Columbus, O.

**Cumberland Valley.**—W. W. Stewart has been appointed Supervisor of Branch Roads, including Mont Alto Railroad, in connection with his duties as Supervisor of Main Line.

**Duluth Great Western.**—At a recent meeting in Duluth the following directors were elected: James M. Paine, J. D. Ensign, Luther Mendenhall, J. D. Ray, C. H. Graves, M. R. Baldwin, H. H. Hanford, J. B. Holmes. Officers chosen were: President, James M. Paine; Vice-President, J. B. Holmes; Treasurer, Luther Mendenhall; Secretary, Frank Meyer.

**Gouverneur & Oswegatchie.**—At the annual meeting of this company, a branch of the New York Central & Hudson River Road, the following directors were elected: Cornelius Vanderbilt, C. M. Depew, Charles C. Clarke, H. J. Hayden, William K. Vanderbilt, Samuel J. Barger, J. Pierpont Morgan and H. Walter Webb.

**Gulf, Colorado & Santa Fe.**—The appointment of B. F. Yoakum as General Manager of the road, with offices at Galveston, Tex. is in effect from April 17. He succeeds C. O. Wheeler, resigned.

**L. J. Polk.** General Agent of the San Antonio & Aransas Pass, has been appointed to a similar position on this road, to succeed W. H. Masters, who has been elected Chairman of the Texas Freight Association.

**Illinois Central.**—J. W. Higgins has been appointed Division Superintendent of the Road in charge of Chicago terminals, to succeed J. T. McBride, resigned. Mr. Higgins goes to Chicago from New Orleans, where he was Superintendent of terminals for the same company. The office he filled there has been abolished.

**Mount Vernon, Bay View & Northern.**—At the first annual meeting at Mount Vernon, Wash., the following officers were elected: President, H. Clothier; Vice-President, H. P. Downs; Treasurer, G. E. Hartson; Secretary, F. L. Crampton, and Superintendent, W. J. McKenna, of Mount Vernon, Wash.

**New York Central & Hudson River.**—At the annual meeting of the stockholders at Albany, N. Y., April 10, about \$65,000,000 of stock was represented. The old Board of Directors was re-elected except that Samuel D. Babcock was elected to fill the vacancy occasioned by the death of Cyrus W. Field.

**New York, New Haven & Hartford.**—George A. Morton, who has for several years past been the Superintendent of the New York & Boston parlor car service, has just been appointed General Baggage Master of the road. F. H. Crane takes Mr. Morton's old position.

**Ohio Southern.**—At the annual meeting of the company at Springfield, O., April 17, these directors were elected: George W. Saul, Springfield, O.; M. W. Barse, Frank A. Barnaby, Calvin S. Brice, Daniel F. Lewis, J. Lee Hinterville and S. Beymer, New York; Judson Harmon and H. B. Moorehead, Cincinnati, O.; Joseph R. Megrue, New York; H. L. Chapman, Columbus, O.; George K. Frey and O. S. Kelly, Springfield, O.

**Pennsylvania Co.**—C. H. Walton, Superintendent of the Cincinnati & Muskingum Valley division of the Pennsylvania lines, has been appointed Superintendent of the Chicago and State line divisions of the Pennsylvania Southwest system. Mr. Walton succeeds Superintendent C. M. Bennett, present Superintendent of the Chicago division, with headquarters at Logansport, Ind. Mr. Bennett is transferred to the Muskingum Valley division, vice Mr. Walton.

**Philadelphia & Erie.**—Robert Redding, Master Mechanic of the Philadelphia & Erie shops at Erie, has been appointed Master Mechanic of the shops of that company at Sunbury, Pa., to succeed H. K. Stout, who has resigned to accept a position in the Pennsylvania shops.

**Philadelphia & Reading.**—Samuel R. Shipley has resigned as a member of the Board of Directors and John Lowber Welsh, who represents the Drexel interest, has been elected to succeed him.

Eugene I. Sandt has been appointed Superintendent of the railroad shops in Reading, Pa., and Solomon Stoudt, of Newbury, General Foreman.

**Portland & Rochester.**—Charles Cobb, formerly Car Accountant, has been appointed Assistant Treasurer, to succeed Dana Cutter resigned.

**San Antonio & Aransas Pass.**—P. H. Goodwin, Chief Clerk, has been appointed Acting General Freight Agent to succeed L. J. Polk, resigned to accept service with another company.

**Union Pacific, Denver & Gulf.**—At the annual meeting held in Denver, Col., April 11, the following directors were re-elected: Frederick L. Ames, Edwin F. Atkins, Samuel Carr, S. H. H. Clark, F. Gordon Dexter, Grenville M. Dodge, John Evans, Morgan Jones, Oliver W. Mink.

**Wagner Palace Car Co.**—Harry D. Vogt, for many years connected with the Pullman company's shops at Pullman, Ill., has been made General Foreman of the Upholstering Department of the above company at East Buffalo, N. Y.

RAILROAD CONSTRUCTION,  
Incorporations, Surveys, Etc.

**Baltimore & Cumberland.**—This company, which is the corporate title of the West Virginia Central & Pittsburgh's eastern extension, is rapidly arranging the work preliminary to actual construction. J. C. Patterson's corps of engineers has finished the surveys on one section, and Chief Engineer Ives has arrived on the ground and is pushing the other parts of the work. Altogether, there are three parties of engineers engaged on the surveys. The grading has been commenced on the West Virginia side of the line in Mineral County, about a mile south of Cumberland, Md. At this point the county road is to be removed to another location to make room for the railroad. This work is in charge of W. E. Porter, with a force of nearly 100 men, and is quite difficult, on account of the stone and heavy clay encountered. At the end of the county road section, at Devil's Slide, the road enters a tunnel which will be cut out of the solid rock for 700 ft. Not all the right of way has been closed yet, but nearly everything in that line has been arranged for. It is thought that the contracts for the entire line can be let about May 1. It is proposed to let the entire line out in sections of five miles each, and to have the work completed within a year. There will be but one bridge of any consequence on the whole road. The course of the road, speaking generally, is along the West Virginia side of the Potomac River to North Branch, where it crosses to the Maryland side and takes the most direct route to Hagerstown, making connections there as described last week. C. M. Hendley, a director of the company, said last week that the building of the new extension has no bearing upon the former plans of the West Virginia Central Company to purchase the Western Maryland. That project has been permanently dropped, and no further effort in that direction will be made. As to the necessity of getting a more direct outlet, he said that it was not an infrequent occurrence to have as many as 500 loaded cars blockaded at Cumberland, waiting for the connecting lines to take them.

**Baltimore & Ohio.**—A report is published that the company will spend about \$300,000 in new second track on the Connellsville Division this summer. The grading for this track was done some time ago. Long sidings will be laid at various points, which may be connected to complete a continuous double track without much further expense. At Harper's Ferry the tunnel under Maryland Heights has been driven in 300 ft. at each end and is being pushed rapidly. All the piles of the new Potomac River bridge are above medium water and the abutments are nearly done. The heavy cutting on the West Virginia side of the river is progressing.

**Boise Railway & Terminal Co.**—The incorporation of this company was recently noted. It has been organized by officers of the Union Pacific to build an extension of the Boise Branch of the Oregon Short Line & Utah Northern road, and will be six miles in length, including the terminal facilities at Boise City, Idaho. The work will include one Howe truss bridge about 300 ft. in length. No contracts have yet been let. E. E. Calvin, of Pocatello, Division Superintendent, is President of the local organization.

**Cambria & Clearfield.**—Upon the Susquehanna Division near the town of Spangler, Pa., the following branches have been completed, and are in operation, namely: Luther, Powell, Hopple, Lantz, Gardner Run, Walnut Run, Bigler, Lambirth-Scott and Porter Run branches. Upon these branches there are 11 coal openings on which eight tipplers have been erected, and the mines are now shipping coal. The reports on the character of this coal, after it has been tested by use in furnaces and mills, are favorable, and it is said to be fully equal to the best Philadelphia coal. The track on the Susquehanna Division has also been extended below Walnut Run as far as Cherry Tree, and will be opened this month. There is a large amount of coal to be developed between Walnut Run and Cherry Tree, notably the Moss Creek Region, which is highly spoken of, and which will probably receive attention during the coming season. However, the capacity of the mines already opened will heavily tax the transportation facilities on this division. On the Cheat Creek Division the following branches have been graded, and the track laid ready for operation, namely: Patton branches Nos. 1, 2, 3 and 4. The two latter will be completed ready for shipment by May 1, and when the mining development around the town of Patton is completed, there will be seven mines ready to ship coal, most of which will be tributary to the Beech Creek and the New York Central & Hudson River railroads.

**Cape Fear & Yadkin Valley.**—The new financial plan recently explained in these columns provides for the issuing of bonds to complete the Cripple Creek extension to the Virginia State line among other proposed improvements. One of the officers writes that it is very probable that this branch will be completed this year, but it has not yet been definitely decided upon and the plans are not far enough advanced to be made public.

**Charleston, Clendennin & Sutton.**—The tracklaying on this line was completed to the 20-mile post on Elk River in West Virginia last Wednesday. One more mile will complete the road to Clendennin, W. Va., and it will be put down as rapidly as possible and the road opened for traffic to that point.

**Chicago, Cascade & Western.**—A charter for this company was filed in Iowa last week, the incorporators being nearly all business men of Cascade, Ia. Their object is to secure the building of a road from Dubuque southwest to connect with the Chicago & Northwestern in Linn County near Cedar Rapids.

**Chicago & Texas.**—Articles of incorporation have been filed in the office of the Secretary of State at Springfield, Ill., this week. It is proposed to operate a railroad from East Cape Girardeau, Ill., north through the counties of Jackson, Union and Alexander to a junction with the Grand Tower & Carbondale road in Jackson county. The incorporators are William W. Barr, of Carbondale; Frank H. Batchelor and John W. Lewis, of Murphysboro; J. P. Foster and J. B. Gazzam, of St. Louis. The Grand Tower & Cape Girardeau road is now operated from East Cape Girardeau to Grand Tower, Ill., and the Grand Tower & Carbondale, which continues the

line to Carbondale, is under the same management. Apparently the new company is to succeed one of these companies.

**Clearfield & Mahoning.**—The high viaduct near Du Bois, Pa., which has been delaying track laying, was completed last week and the track laid across it. The other bridge work is not likely to cause any serious delays, and Mr. J. M. Floesch, Chief Engineer, expects that trains will be running between Du Bois and Clearfield, Pa., 26 miles, before June 1.

**Cleveland & Pittsburgh.**—This company has commenced the work of relaying the river division from Wellsville to Bellaire, O., with new rails. The new track will all be 90-lb. rails and will be ballasted with gravel. The track from Bellaire to Portland Station will be raised about two inches. All the old through bridges will be replaced with new and stronger bridges. This is to allow the heavy engines now in use on the main line to be used on the river division. The new rails are laid as far as Toronto, more than half way, but the ballasting has not been completed that far.

**Cross Fork.**—A charter for this company was filed at Harrisburg, Pa., on April 12, although construction work has been in progress on the line since last fall. The road is being built through Potter County, Pa., and is 13 miles long, extending from Shingle Bolt Summit, near Huls, Pa., on the Buffalo & Susquehanna road, to Cross Fork, Pa. The new line is a branch of the Sinnemahoning Valley road, of which F. H. Goodyear, of Buffalo, is President. W. I. Lewis, of Harrisburg, Pa., is President of the above company, and C. W. Goodyear, of Anstin, Pa., one of the directors.

**Denver & Rio Grande.**—The storms during April have materially interfered with the railroad construction on the Crested Butte branch. George Bell, the contractor for the road to Ruby-Anthracite, Col., a distance of 11 miles, cannot make any headway on the line until the weather settles. The Colorado Fuel & Iron Co., to whose coal mines this road is being constructed, will not get in the breaker machinery until the track is laid.

**Duluth Great Western.**—This company was formed at Duluth, Minn., last week, and is a reorganization of the Duluth, Red Lake Falls & Northern, a projected line from Duluth, and J. B. Holmes, of Duluth, is the chief officer of the new company as he was of the old project. It is proposed to build a railroad from Duluth to the Mesabi Iron Range in Northern Minnesota. Last fall the Duluth city council passed an ordinance giving the company a valuable franchise for proposed terminals on Minnesota Point, but the company has never built any road.

**Ebensburg & Black Lick.**—This road is now under contract from Ebensburg, Pa., as far as Coal Pit Run, at the big bend of the south branch of Black Lick Creek, a distance of 10.5 miles, in which distance it falls from an elevation of 2,032 ft. above tide at Ebensburg to 1,670 ft. at Coal Pit Run. This elevation is overcome within the first five miles by the use of maximum grades of 1.1 per cent., equated upon curves. The line is laid by a hillside development through a timbered country, underlain by bituminous coal of good quality, low in sulphur and of an average thickness for the three beds of upward of 12 ft., or 12,000 tons of merchantable coal an acre. It is roughly estimated that this Black Lick coal basin will furnish an output of at least 200,000,000 tons of coal to be exported over the Ebensburg & Black Lick branch. "A" vein, which is upward of six feet in thickness, crops out at a point about nine miles west of Ebensburg, and the two Freeport veins, "D" and "E," lying higher, are found nearer to Ebensburg and upon the headwaters of the north fork of Black Lick Creek. Through the influence of Judge A. V. Barker, of Ebensburg; Charles McFadden and other large owners of coal lands in this region, the right of way for this road has been obtained, and the work is now actively progressing, a large grading force being employed between Ebensburg and Coal Pit Run. Charles McFadden, 735 Market street, Philadelphia, has the contract for the grading and masonry work.

**Fairmont, Morgantown & Pittsburgh.**—It is reported that the directors of the Baltimore & Ohio have decided that when the extension now building is completed the road will be merged into the line now known as the State Line road. The first steel bridge for the line was received at Morgantown last week. It is to span Eight Mile Creek. The structural work for the other bridges is coming in rapidly now. Lane Brothers, who have the contract for grading and ballasting the first six miles out of Morgantown, W. Va., will have their work completed by May 1. At some other points the roadbed has slipped during the winter and it will have to be practically rebuilt. Drake, Stratton & Co. are pushing the work on the Cheat River bridge and the arch over Camp Run. They will soon be through with their contract. Most of the work between the Pennsylvania State line and Uniontown, Pa., is nearly completed.

**Gulf, Beaumont & Kansas.**—John H. Kirby, of Houston, Tex., General Manager of this projected road, telegraphs from Boston, where he has been for some weeks, to the local Texas projectors that arrangements have been made by the Boston directors, E. E. Pratt and others, for building 70 miles of the road. Mr. Kirby is expected to reach Houston by May 1, and work is expected to begin shortly after. The road is projected from Beaumont, on the Neches River, north through Eastern Texas to quarries in Jasper County.

**Kansas City, Pittsburgh & Gulf.**—Newspaper dispatches state that this company has purchased the Kansas City, Fort Smith & Southern road which is now in operation from Joplin, Mo., south to Sulphur Springs, Ark., 51 miles. It is also said that the contract has been let for building 25 miles of new line to connect the two roads. It will be necessary to build a line from Pittsburgh, Kan., to which town the Kansas City, Pittsburgh & Gulf is now being extended, south to Joplin to complete this connection. The acquisition of the Kansas City, Fort Smith & Southern is apparently part of the scheme to complete a line to Texarkana. The Texarkana & Fort Smith, which owns 30 miles of road north of Texarkana, has already been purchased.

**Long Island.**—The company is considering the project of extending its tracks to East Hampton and Amagansett at the east end of the island, with the probability of building them to Fort Pond Bay at Montauk Point. It is intimated that if the necessary right of way can be secured the company will begin work without delay.

**Metropolitan Belt (Mexico City).**—George Tritch, of Denver, Col., who was granted a concession several months ago for a railroad around the City of Mexico, is



now in that city to arrange for beginning the work of constructing the line. The corporation which will undertake the project is the Metropolitan Belt Railway Co., of which Mr. Titch is President. Gen. Herman Strum and Philip Zang are heavy stockholders in the enterprise.

**Middlesex Valley.**—The proposed extension to connect with the Lehigh Valley and New York Central roads at Geneva, N. Y., is again revived. It is stated that the company has agreed to commence the construction work at once near Stanley, N. Y., its present northern terminus, where it connects with the Northern Central road. The branch will be about 15 miles long.

**Midland Rapid Transit.**—Mayor Washburne vetoed the ordinance passed by the Board of Aldermen of Chicago, granting this company extensive privileges to occupy the city streets with an elevated road, and the veto was sustained. The names of Alfred A. Reed and I. L. Marvel, of New York, are given as the Eastern directors of the company.

**Muskegon Terminal.**—A company of this name filed a charter in Michigan this week, the capital stock being \$450,000.

**Nelson & Fort Sheppard.**—The contract for building this road was let last week to Peter Larson, of Helena. The road is an extension of the Spokane & Northern, meeting that line at the British Columbia line, and extending 60 miles north into Nelson, B. C. The Spokane & Northern is operated as far as Northport, Wash., and will be extended to the British Columbia line this summer, where the tracks of two roads will meet. The management of the two roads is the same. The contract provides that the road shall be completed by October and ballasted ready for trains to pass over before snow comes.

**Norwalk, Fairfield & Southern.**—The organization of this company, recently chartered in Ohio, is now being completed, and John A. Williamson, of Norwalk, O., has been elected President. The plan of the incorporators is to build an interurban road about 10 miles long from Norwalk directly south to Fairfield, Huron County, O., the latter town being located in a part of the county which has very little railroad facilities. Norwalk is the county seat, and the railroad route between the two towns is very indirect.

**Philadelphia & Delaware County.**—The proposed branch of the Pennsylvania to Newtown Square will probably be begun this spring. No definite action has yet been taken, however, and the construction of the road has not been authorized by the directors of the Pennsylvania, which owns the majority of the stock. The Board of the latter company has agreed to proceed with the construction of the new branch from a point on the P. & D. Division at Fernwood station, just outside of the city limits of Philadelphia, to Newtown Square, in Newtown Township, Delaware County, provided the property owners and others interested in the development of this line will subscribe \$100,000 to the capital stock of the new company, and provided further that free right of way and station grounds be donated. This matter is now in the hands of a committee of interested citizens and residents of Delaware County, but they have not yet reported to the railroad company that they have accepted the proposition, and therefore the matter is still unsettled. This road traverses a beautiful rolling country in Delaware County. It first climbs to the summit of the divide at the head of Naylor's Run and passing south of Coopertown drops into Darby Creek, from which it rises to the ridge upon which Newtown Square is situated, about 13 miles from Philadelphia and at an elevation of 450 ft. above the Delaware River.

**Rice Lake, Dallas & Menomonic.**—Work will probably be commenced very shortly on the first section of this road from Rice Lake, Wis., south to a point on the Minneapolis, St. Paul & Sault Ste. Marie road between Cameron and Barron, Wis., and this section, the officers say, will be completed in June next. The surveys are now being made from Rice Lake to Dallas and Menomonic, about 45 miles, by H. A. Clark, of St. Paul, Chief Engineer.

**Roaring Creek & Charleston.**—A charter was issued last week in West Virginia to the above company, proposing to build a standard gauge road from the mouth of Roaring creek, Randolph County, W. Va., to Charleston, the state capital. The capital stock is \$3,000,000, and is held by S. B. Diller, J. D. Skeets and W. F. Diller of Lancaster, Pa.; O. C. Womelsdorf, Pottsville, Pa., and D. P. Baker of Beverly, W. Va. The principal office will be at Elkins, W. Va. It is the intention to build a line at once from the mouth of Roaring Creek into the timber and coal country south of that point, and ultimately to Charleston or to a connection with some railroad in the central part of the state which will give the road such a connection.

**San Diego & Phoenix.**—Articles of incorporation of the railroad company have been filed in California the past week. This company is incorporated to build a road from the Bay of San Diego to the boundary line of California at or near Fort Yuma, Ariz. The estimated length is 175 miles. The directors are D. C. Reed, Harry L. Titus, H. G. Merrill, C. U. Bell and A. Roberts.

**Saranac & Lake Placid.**—The contract for the construction of this road has just been let by President C. E. Arnold, of Albany, N. Y., to the firm of Brady Bros., of Bayonne, N. J. The road will be completed and ready for operation by July 15. It will be about 10 miles long, extending from a point on the branch of the Adirondack & St. Lawrence to Saranac Lake, eastwardly around Sugar Loaf Mountain to Lake Placid, N. Y.

**South Florida.**—The grading is now being done on the Pemberton extension from both the southern and northern ends. The road was completed last year from Pemberton Junction north to Inverness, Fla., 20 miles. From the latter point the Silver Springs, Ocala & Gulf has a nearly direct line to Blue Springs near Dunnellon, 20 miles, which it will be necessary to parallel, unless some agreement for using this line is made between the two companies. The grading is now in progress from Blue Springs, and also south from a point near High Springs, Fla., the northern terminus where the junction is made with the Savannah, Florida & Western. The only bridge on the new line is that across the Withlacoochee River near Dunnellon. Morgan, Reynolds & Walker have the contract for building the extension.

**Springfield, Sedalia, Marshall & Northern.**—President O. A. Crandall announces that construction work will begin this week at Sedalia, Mo. The road is projected as a north and south line through Missouri, and preliminary surveys have been made. The projectors

are now trying to secure the right of way into Springfield, Mo.

**West Jersey.**—The officers contradict the report that the main line to Cape May, N. J., is to be made a double track road with the funds secured through the sale of the new stock recently authorized by the directors. They say that no plans have been made for systematic double tracking and that the only second track to be laid this season will be on about four miles from Atlantic City, and for several miles from Camden, N. J. A number of long and important sidings will be built, and there are many improvements to freight and passenger stations which will be carried out. New equipment will also be purchased.

**Wyoming & Utah.**—General Manager Isaac Van Horn, of Lincoln, Neb., states that the engineers, under charge of Charles S. Rogers, Chief Engineer, are now in the field on the location of this line, and he expects to arrange for the building of 100 miles of the road this year west of Casper, Wyo. The annual meeting will be held at 28 School street, Boston, on May 11.

#### GENERAL RAILROAD NEWS.

**Bellaire, Zanesville & Cincinnati.**—The sale of nine miles of this line to the Columbus, Shawnee & Hocking, by the County Commissioners of Muskingum County, O., which was reported last week, may cause considerable litigation. Citizens of the county have commenced proceedings looking to the annulling of the transfer owing to dissatisfaction concerning the price. The bid was \$5,500 lower than that of the Cleveland, Akron & Columbus (\$30,500), but it is the view of those moving in the matter that both bids should have been rejected. The building of the road cost the county \$123,000, and the Bellaire, Zanesville & Cincinnati is in arrears \$30,000 for rent, for which it declares itself unable to pay. The belief that a part of this sum could have been made good to the county is the reason for the present movement.

**Charleston, Cincinnati & Chicago.**—The reported sale of about \$2,000,000 of the bonds of this company held by the Finance Co. of Philadelphia, to a Cincinnati syndicate, seems to have been a less important matter than it was made out to be in Philadelphia. The sale does not include a controlling interest in the property, for the Finance Co. does not hold such an interest. The bonds, even if sold, could not be delivered now, as they are held in trust for reorganization purposes. If the reorganization committee buys the property at foreclosure for the bondholders, a revised plan must be agreed upon in order to raise the money to complete the line. A large part of the minimum sum required by the court as a bid has been raised by the bondholders, no part of which has been subscribed by the Finance Co.

**Chicago & Grand Trunk.**—A meeting of the stockholders was held this week at the company's office in Chicago. The principal object of the meeting was to consider a proposition to create a third mortgage on the company's property to secure an issue of bonds to the amount of \$6,000,000 to cover indebtedness already created, and to provide for such other improvements as may be required hereafter. The proposition was carried by a unanimous vote.

**Dominion Atlantic.**—A plan for the amalgamation of the Windsor & Annapolis and the Western Counties roads in Nova Scotia, to give a continuous line from Yarmouth to Halifax, 217 miles, is said to be under discussion and likely to be carried out this summer. The Western Counties road has long been in litigation. It operates a line between Yarmouth and Annapolis, 87 miles, 20 miles between Digby and Annapolis, having been built by the Canadian Government two years ago. The Windsor & Annapolis operates a line from Annapolis to Windsor Junction on the Intercolonial road near Halifax.

**Findlay, Fort Wayne & Western.**—The directors are reported to have decided upon building the proposed extension east from Findlay to New London in Huron County, O. The surveys of this line have all been made and it is supposed that the work will be commenced without much further delay.

**Illinois Central.**—The financial statement for February is as below:

	1893.	1892.	Inc. or dec.
Gross earn.	\$1,432,194	\$1,570,163	D. \$117,969
Oper. expen.	1,153,123	1,141,208	I. 11,915
Net earn.	\$279,071	\$428,955	D. \$149,884
Eight months to Feb. 28:			
Gross earn.	\$13,193,149	\$13,250,608	D. \$57,459
Oper. expen.	9,621,139	9,368,728	I. 252,411
Net earn.	\$3,572,010	\$3,881,880	D. \$309,87

**New York Central & Hudson River.**—The following questions were voted on at meetings of the stockholders at Albany this week, following the annual meeting, viz.: To authorize the increase of the capital stock of the company from \$89,428,300 to \$100,000,000; to authorize the acquisition of the New York & Northern Railroad; to authorize the leasing of the following lines: Mohawk & Malone, Carthage & Adirondack, and Gouverneur & Oswegatchie. Upon these questions the affirmative vote aggregated between \$62,000,000 and \$63,000,000 of stock, and there were no votes in the negative.

**Norfolk & Western.**—The twelfth annual report of the company for the year ending Dec. 31, 1892, shows gross earnings, \$9,952,881; operating expenses and taxes, \$7,031,672; net earnings, \$2,921,209. Additional income of \$144,606 and \$136,260, remainder of special dividend fund, make the total income \$3,202,075. The fixed charges amount to \$2,475,761, which, deducted from the total income, leaves the net income \$726,314. The previous surplus of \$1,456,976 added to the net income makes the total surplus \$2,183,290. Out of this there were paid \$1,030,000 in dividends, and \$139,453 in purchase of bonds for the sinking fund. As compared with the previous year there was an increase in gross earnings of \$764,839, and in operating expenses, including taxes, of \$1,021,905, and a decrease in net earnings of \$257,065.

**Richmond & West Point Terminal.**—Announcement was made last week that the firm of Drexel, Morgan & Co., which had for the second time been asked to carry through the reorganization of the properties embraced in the system, had agreed to undertake the reorganization of the company. The holders of the 6 per cent. trust bonds, 5 per cent. trust bonds, preferred stock and common stock, are asked to deposit their securities with the firm named, before May 1, and Drexel, Morgan & Co. will then announce a plan of re-

organization. The letter of Drexel, Morgan & Co. to the committee, consisting of William P. Clyde, George F. Stone, Samuel Thomas, William E. Strong, J. C. Maben and Thomas F. Ryan, simply states that the firm will undertake the reorganization, if the securities are deposited, and does not give any idea of the terms on which the proposed reorganization will take place. They ask for the deposit of several classes of securities of the Terminal Company and full authority to include these securities of the company in their final proposition.

#### TRAFFIC.

##### Traffic Notes.

The Central of Georgia now limits local tickets to one day after date of sale.

The roads running south from St. Louis and doing business in Texas have formed the "Texas Freight Association." Its Chairman is W. P. Masters, late General Freight Agent of the Gulf, Colorado & Santa Fé.

The rate war in Colorado announced last week arose from alleged differences in construing the passenger agreement. The Denver & Rio Grande promptly met the reduced rates established by the Colorado Midland.

During the month of March the Norfolk & Western handled in the Bluefield (W. Va.) yards 13,500 cars of coal and coke, all produced on its own line in that vicinity. This was an increase of 1,500 cars over the month previous.

The Little Rock & Memphis has entered a suit in the United States Court against the Missouri Pacific for \$250,000 damages, based on the refusal of the Missouri Pacific to sell through tickets, and issue through bills of lading, over the Little Rock road.

A dispatch from Cheyenne, Wyo., states that the movement of cattle from Texas to Wyoming and Montana last year amounted to 400 train loads, and that the Atchison and the Burlington have secured the whole business for this year, shutting out the Union Pacific.

The Colorado Traffic Association, an organization of shippers, held its annual meeting in Denver last week. Commissioner Janes, Treasurer Fisher, and Secretary Sage submitted reports. The following officers were elected: President, J. K. Choate; First Vice-President, Alva Adams, Pueblo; Second Vice-President, F. F. Struby; Treasurer, W. G. Fisher; Secretary, Charles H. Sage.

The Erie road is already agitating the question of further reductions in passenger rates to Chicago for the World's Fair. It is claimed that the New York Central and the West Shore have made contracts at less than tariff rates. An excursion agent in New York advertises a train to run over the West Shore and the Michigan Central daily from and after May 15, running through in 26 hours, and allowing a stop over at Niagara Falls on the return. The railroad fare is not stated in the advertisements. The tickets include hotel accommodations at Chicago.

The Massachusetts Legislature has been investigating the claims of Boston fruit and produce dealers, that they have been inconvenienced by the diversion of the freight from the New York & New England to the Old Colony road. The New Haven road is accused of diverting the freight to favor the Old Colony. The merits of the controversy cannot be made out from the published reports, as the diversion, which in every case seems to have been technically permissible, was influenced by defective transfer facilities at some places, by the unwillingness of the New England road to agree to certain regulations, and other conditions which the testimony does not make clear. The general accusation, that the Boston freight terminals of the Old Colony were inadequate, while those of the New England had proved satisfactory to the consignees, seems not to have been disproved.

##### Chicago Traffic Matters.

CHICAGO, April 19, 1893.

The managers of the Western Passenger Association are still in session, considering the matter of rules to be made for the government of business under the revised agreement and also considering the question of rates to the World's Fair. Differences of opinion have arisen as to rates from trans-Missouri territory, and until this question is settled there will be no attempt to fix a general schedule.

An agreement has been made between the transcontinental lines restoring divisions on transcontinental business which have for some time been discontinued owing to the refusal of the Southern Pacific to accept the reduced rates westbound on the old divisions. The Eastern lines, however, still decline to accept the new rates, or any rates not made directly with them, and will not pro-rate on the reduced tariffs.

Chairman Midgley has been investigating complaints made against the Iowa Central that that line was continuing in effect certain proportional tariffs on commodities from the East, destined to the Northwest, after authority had been given in the Central Traffic Association to make the Chicago rates to Peoria. Mr. Midgley now rules that the tariffs are in effect without authority and must be withdrawn not later than April 30.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending April 15, amounted to 64,834 tons, against 70,370 tons during the preceding week, a decrease of 5,536 tons, and against 80,062 tons during the corresponding week of 1892. The proportions carried by each road were:

Roads.	Wk to Apl. 15.		Wk to Apl. 8.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	9,949	15.4	7,982	11.3
Wabash.....	4,324	6.7	3,788	5.4
Lake Shore & Michigan South.	12,706	19.6	12,808	18.2
Pitts., Ft. Wayne & Chicago..	8,886	13.7	9,223	14.1
Pitts., Cin., Chicago & St. Louis	5,746	8.7	6,829	9.7
Baltimore & Ohio.....	3,415	5.3	3,701	5.3
Chicago & Grand Trunk.....	7,262	11.2	10,344	14.7
New York, Chic. & St. Louis..	3,961	6.1	5,888	8.4
Chicago & Erie.....	5,254	8.1	6,541	9.3
C. C., C. & St. Louis.....	3,331	5.2	2,556	3.6
Totals.....	64,834	100.0	70,370	100.0

Of the above shipments 4,645 tons were flour, 32,493 tons grain and millstuff, 5,571 tons cured meats, 10,504 tons dressed beef, 993 tons butter, 901 tons hides, and 6,749 tons lumber. The three Vanderbilt lines carried 41.1 per cent., the two Pennsylvania lines 22.4 per cent.